

OPERATING MANAGEMENT'S
OWN MAGAZINE.

Foreign-owned CPI Plants in U.S.

Building step-up brings tougher competition,
but some direct benefits as well . . . 25

L-M-W Polyethylenes Take Hold

Use as wax modifiers and replacements paces
resins to 40-million-lb/yr market . . . 39



CHEMICAL PROCESSING®

FEBRUARY 1961

SHOULD YOU DO RESEARCH IN EUROPE?

You'll face a tough new
set of management problems
. . . but the scientific
creativity you tap may pay
handsome dividends page 34



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"Executive Magazines for Industry"

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**conventions
and exhibits**

Allied Chemical announces 50% boost in HF capacity at Nitro, W. Va. plant

NITRO, W. VA., March, 1960—Allied Chemical's General Chemical Division announced today that it has expanded by more than 50% the productive capacity of its anhydrous hydrofluoric acid plant at Nitro, West Virginia. This is one of several developments which strengthen Allied Chemical's position in fluorine chemicals. The Company has also recently acquired more than one million tons of additional fluorspar reserves.

B&A opens new facilities for Electronic Chemicals at Los Angeles

LOS ANGELES, June, 1960—General Chemical today opened extensive new production and packaging facilities for its line of Baker & Adamson "Electronic Grade" Chemicals at nearby El Segundo to serve the booming West Coast electronics industry.

GENERAL CHEMICAL LIQUID ALUM PLANT "ON STREAM" AT EL SEGUNDO, CALIF.

LOS ANGELES, July, 1960—General Chemical has completed its newest facility for production of liquid aluminum sulfate at El Segundo, California. This is General Chemical's twenty-ninth plant providing dry or liquid alum for pulp and paper manufacture, water and sewage treatment and other uses.

Top quality phosphoric acid soon to flow from new General Chemical plant at E. St. Louis, Illinois

ST. LOUIS, December, 1960—General Chemical reported today that its new wet-process phosphoric acid plant at E. St. Louis, Illinois, is rapidly nearing completion. Important engineering advancements will permit production of finer quality green phosphoric acid than any presently available. Substantial savings are forecast for users because the new product is cleaner, freer from solids, and easier to use.

1/3 INCREASE IN "GENETRON" CAPACITY TO COME FROM NEW GENERAL CHEMICAL PLANT IN ELIZABETH, NEW JERSEY

NEW YORK, N.Y., October, 1960—A third plant to produce its "Genetron" line of fluorinated hydrocarbons is now being built by Allied Chemical's General Chemical Division in Elizabeth, N.J., to serve East Coast refrigerant and aerosol propellant users.

New General Chemical facilities...

announced in '60...

ready to serve you in '61

General Chemical continues to grow in order to serve industry's growing needs. This is evidenced by the many new plants and facilities we started or completed during 1960. From them will come increased production of the products highlighted here . . . other basic and special chemicals, too!

Promise of further growth is also inherent in the substantial expansion of our Research Laboratory at Morristown, New Jersey, which will be completed this year.

To learn more about the broad range of products we are geared to serve you with in the soaring 60's, write today for our free new brochure "Chemicals For Industry." Business letterhead, please.



GENERAL CHEMICAL DIVISION

40 Rector Street, New York 6, N.Y.

Basic to America's Progress

Check 2366 opposite last page.

Feb. 7-9. The Society of the Plastics Industry, Inc., 16th Reinforced Plastics Division Conference, Edgewater Beach Hotel, Chicago, Ill.

Feb. 13-15. Pharmaceutical Manufacturers Association, Central Regional Meeting, Edgewater Beach Hotel, Chicago, Ill.

Feb. 13-16. International Heating & Air-Conditioning Exposition and annual meeting of American Society of Heating, Refrigerating and Air-Conditioning Engineers, International Amphitheatre, Chicago, Ill.

Feb. 20-21. Pharmaceutical Manufacturers Association, Western Regional Meeting, Ambassador Hotel, Los Angeles, Calif.

Feb. 20-23. Technical Association of the Pulp & Paper Industry, Annual Meeting, Commodore Hotel, New York.

Feb. 22-24. The Material Handling Institute, Pacific Coast Show, Cow Palace, San Francisco, Calif.

Feb. 25-March 1. American Institute of Chemical Engineers, Petrochemical and Refining Exposition and AIChE Annual Meeting, Municipal Auditorium, New Orleans, La.

March 2. Drug, Chemical & Allied Trades Association, Annual Banquet, Waldorf-Astoria Hotel, New York, N.Y.

Mar. 13-17. National Association of Corrosion Engineers, Annual Conference, Statler Hotel, Buffalo, N.Y.

Mar. 20-24. American Society for Metals, 12th Western Metal Congress and Exposition, Pan-Pacific Auditorium, Los Angeles, Calif.

Mar. 21-23. 23rd Annual American Power Conference, Sherman Hotel, Chicago, Ill.

Meetings and shows of interest to the chemical industries

Mar. 21-30. American Chemical Society, National Meeting, St. Louis, Mo.

Mar. 27-31. Instrument Society of America, American Institute of Physics and National Bureau of Standards, National Symposium, "Temperature — Its Measurement and Control in Science and Industry," Veterans Memorial Auditorium, Columbus, Ohio.

Mar. 28-29. Commercial Chemical Development Association, Meeting, Hotel Roosevelt, New York City.

April 10-13. 30th National Packaging Exposition, American Management Association, Exposition Hall, Chicago, Ill.

April 17-19. 7th National ISA Symposium on "Instrumental Methods of Analysis," Shamrock-Hilton Hotel, Houston, Texas.

April 30-May 3. Pharmaceutical Manufacturers Association, Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

April 27-28. Fiber Society, Spring Meeting, Georgia Center for Continuing Education, Athens, Ga.

April 30-May 4. Electrochemical Society, Claypool Hotel, Indianapolis, Ind.

May 21-23. Fluid Controls Institute, Inc., Meeting, The Cloister, Sea Island, Georgia.

May 22-25. The Design Engineering Show, and Conference, Cobo Hall, Detroit, Mich.

May 24-25. Commercial Chemical Development Association, Meeting, Bedford Springs Hotel, Bedford Springs, Pa.

June 5-9. 9th National Plastics Exposition, Coliseum, New York, and the SPI National Plastics Conference, Commodore Hotel, New York.



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The remarkable solvent that brightens the day
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2-NP ($\text{CH}_3\text{CHNO}_2\text{CH}_3$) is an extraordinarily versatile member of the CSC Nitroparaffin family. Its most important property is its strong solvent power for a wide variety of materials including many natural resins, synthetic resins, coating materials, dyes, organic chemicals and fats and oils. Of special interest is the cosolvent effect of 2-NP and/or toluol and alcohol, making it an outstanding solvent for many vinyl resins and acrylics. It is a superior solvent for epoxies and cellulosics.

2-NP is to the newer coatings what butyl acetate has been to nitrocellulose — an ideal solvent. 2-NP's evaporation rate permits maximum flow and leveling without delaying drying time.

Unlike ketones, 2-NP in vinyl eliminates problems of solvent residue and solvent odor, too. It has several safety features such as relatively high flash point and a high lower-flammability limit of vapors in air. Write for all the literature that details how CSC's 2-Nitropropane can brighten your day.

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Other Solvents (volume)

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MEK	568
Toluol	197
MIBK	186
2-NP	110
n-Butyl Acetate	100
Xylol	69
Cellosolve	38
Isophorone	4.3

Flash Points
(°F Tag Open Cup) of 2-NP
Compared to Other Solvents

Acetone	16
MEK	30
Toluol	56
MIBK	81
Xylol	85
n-Butyl Acetate	92
2-NP	103
Cellosolve	126
Isophorone	202

Comparison of Lower Limit of
Flammability of 2-NP With
Other Solvents
(% by volume in air)

MIBK	0.9
Xylol	1.0
Toluol	1.27
n-Butyl Acetate	1.7
MEK	1.8
Acetone	2.15
2-Nitropropane	2.6
Cellosolve	2.6

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OFFICES IN PRINCIPAL CITIES



Check 2367 opposite last page.

THIS MONTH'S COVER

Europe's scientists can provide U.S. industry with hard-to-find creativity. But getting them to "play on our team" has been a ticklish problem. A new approach in developing — one that should pay off in better and more profitable working relationships for the future (page 34).

(Frankfort-on-Main street scene is by Ewing Galloway, N.Y.)

Special This Month**25 Foreign investment in U.S. CPI exceeds \$2 billion**

Trend upward, with 12 plants built within past two years at \$200 million cost — more planned

29 ChE degree helps, but others reach top, too

Survey shows surprising number of key slots being held in chemical companies by men with other backgrounds

34 Honeymoon over for U.S. research in Europe

Advantages still there but picture dulled by costs, supervisory problems, unavailability of top men

39 L-M-W polyethylene mart tops 40 million lb/yr

Growth in past five years credited largely to use as wax modifiers, replacements

74 Centrifuge refunds itself annually

Clarifies 30 gpm linseed oil more rapidly, more neatly — and saves up to \$45,200 / yr

100 Titanium baskets halt anode waste

Savings justify costly metal as units assure 100% use of nickel plates in catalyst plant

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over the editor's
shoulder



Who's watching the store?

Could we suggest you make a little test? Simply ask three or four of your co-workers what college degree they have.

Perhaps you've assumed your next-desk neighbor is a ChE . . . or a chemist. But you may discover he's an ME, an EE, an AB . . . or maybe he has no formal degree at all but has picked up his skills and knowledge via the route of self-education and plain hard work.

Don't be too surprised at the results of your check. The chemical company is truly cosmopolitan in terms of educational backgrounds of its key technical and operating-management personnel. This is pointed up in our recent survey (page 29) of 1500 such men in 18 top chemical firms.

Thirty-three different college or university degrees, technical and non-technical, were mentioned in survey returns. And this does not include key men in such functions as sales and marketing, purchasing, finance, law, public relations and advertising.

True, chemical engineering and chemistry degrees showed up strongly (42% and 17%, respectively, of the men had such degrees) . . . but the fact remains that there are plenty of individuals with other educational backgrounds in key slots.

This, we believe, lends strong support to our editorial and circulation philosophies. CHEMICAL PROCESSING is geared to serve and to be understood by operating management throughout the chemical processing company — no matter what the educational backgrounds of such decision-makers. These are the men responsible for the most effective application of ideas, materials and equipment in the CPI.

Dana B. Berg

Executive Editor



WITHOUT ADEQUATE PROTECTION, this spectacular tank fire spread wildly and caused many thousands of dollars of refinery property damage.

Keep tank fires from getting out of control with Grinnell Water Spray

Proper safeguards are uppermost in importance in protecting tanks which contain flammable gases and liquids in the event of fire. For example, tanks must be guarded against extreme heat exposure. Leaking gas, if it should develop, must be diluted to the point where it will not burn. And fire, if it should occur, must be localized and controlled or extinguished.

With a Grinnell Water Spray System, you get such protection.

Before heat raises tank temperatures dangerously, an enveloping spray of water provides instant cooling, reducing internal pressure which helps prevent rupture. In addition,

air turbulence is created (even in still air) which, in conjunction with the water vapor from the spray, helps dilute the flammable vapors to control or extinguish the fire. Flammable products which cannot be safely extinguished can be safely burned off under the protecting water spray.

FREE REFERENCE MANUAL. For a comprehensive picture of all the most advanced methods of special hazard fire protection, request your free copy of "Special Hazard Fire Protection by Grinnell." Write Grinnell Company, Providence 1, R. I. Branches in principal cities.



GRINNELL WATER SPRAY SYSTEM under test at the Marietta, Ohio plant of the Bakelite Union Carbide Plastic Company, a division of the Union Carbide Corporation. Water — when it is applied in time and distributed over the surfaces efficiently by a properly engineered system — is most effective in limiting tank fires and controlling their spread.

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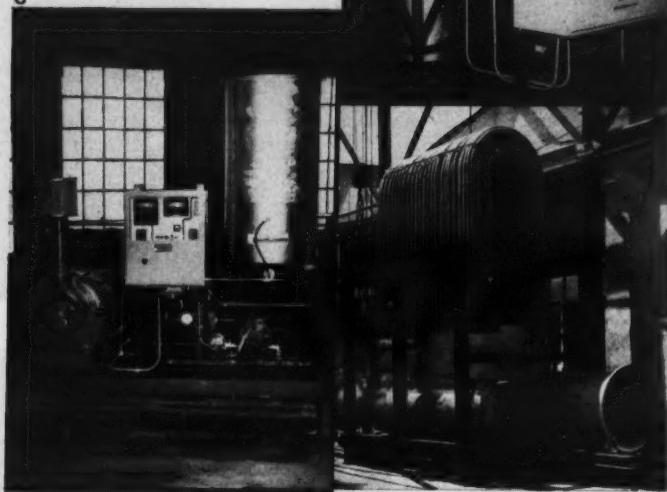
Check 2368 opposite last page.

for chemical processing requirements...

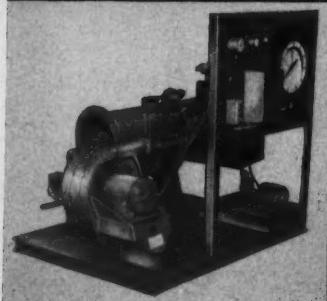
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For further information write for Bulletin 113 (indirect fired) • 112 (direct fired)

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Check 2869 opposite last page.

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OTHER SUBSCRIPTIONS — from "non-qualified" persons (those who are not key processing men in the chemical industries) — are accepted at \$1.00 the copy, or \$10.00 the year. Foreign subscriptions — subscriptions from countries outside the territory of the United States and its possessions — are acceptable at \$35.00 per year. Such subscriptions are not counted as "industry circulation" on BPA audit reports.

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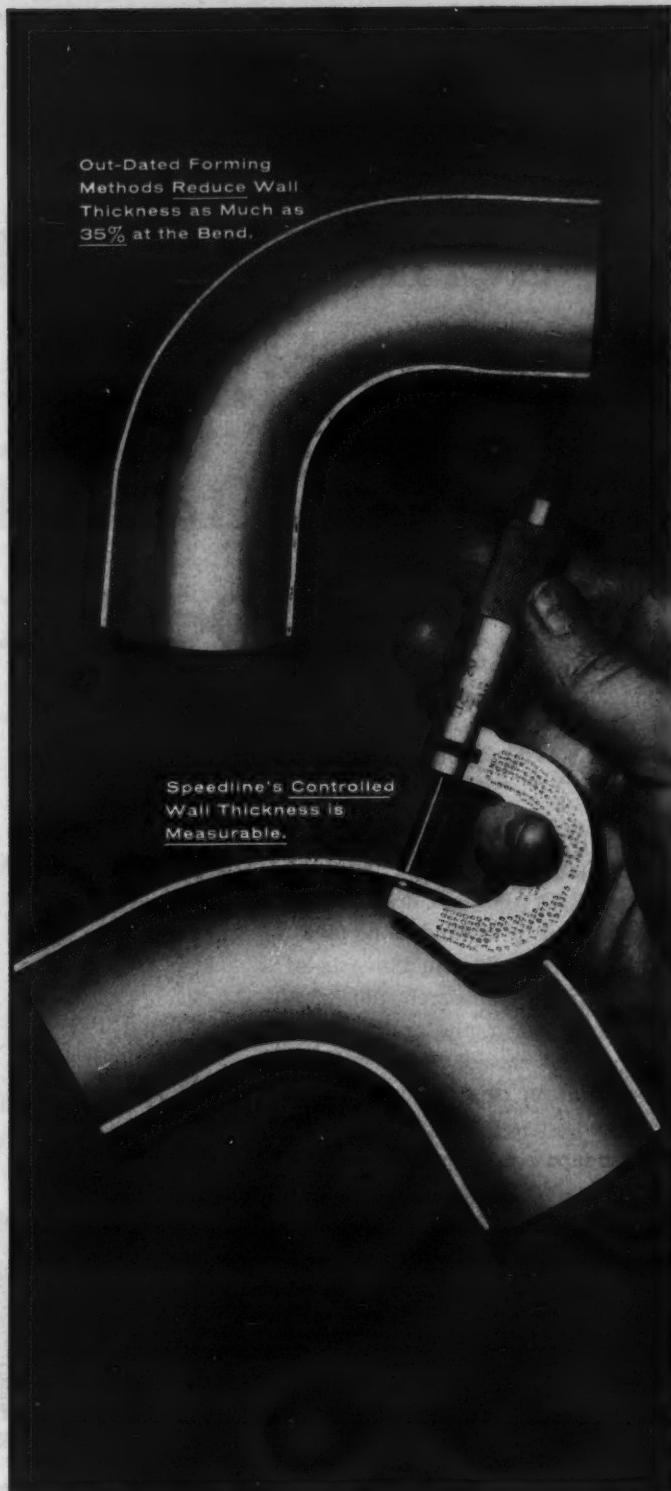
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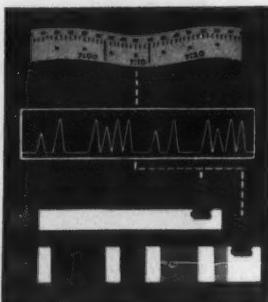
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Check 2370 opposite last page.

to achieve greater accuracy and flexibility in process stream analysis . . . MSA brings tape programming to Gas Chromatography

A tape-programmed control unit is the key to improved accuracy and flexibility in MSA's new Gas Chromatograph. It's the first of its kind to be used for this purpose. System consists of a motor-driven transparent film in conjunction with a photoelectric transmitter and receiver to provide any combination of time and sequence required.

The tape is a single continuous loop of standard 16-mm film. It's printed in 1-second graduations. Setting up a program is simple: just mark the tape with



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MSA backs up its label with selection, quality, research, experience

a lead pencil at appropriate intervals. Repeatability is to within 1/10 of a second.

Here are some other features of the new M-S-A® Gas Chromatograph: analyzer temperature is controlled to within .03°F; a three position function switch permits rapid change from bar graph to spectrum presentation or manual operation; and the analyzer unit can accommodate two columns each up to 50 feet in length.

Write for new tell-all bulletin on this new chromatograph.

INSTRUMENT DIVISION

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Pittsburgh 8, Pennsylvania

CHEM-TRENDS / Our Growing Industry

Mergers strengthen, open doors to new fields for three CPI firms

At least three chemical processing industry companies open the new year with slightly changed corporate complexions as a result of mergers with other companies. The maneuvers were expected to strengthen existing positions and open new avenues of diversification for both firms.

Bioferm Corporation, a leader in the microbiological fermentation field, was absorbed by **International Minerals & Chemical Corporation**. Bioferm was added to IMC's Amino Division as a result of a stock transaction agreement with George Gelman, Bioferm president, and Jerry M. Sudarsky, executive vice president and treasurer, joint owners of the microbiological fermentation pioneer.

Bioferm is a leading producer of vitamin B₁₂ and has recently been scaling up to commercial status a fermentation process for monosodium glutamate.

Additional details have been revealed of the plan by which **The Dow Chemical Company** acquired **Allied Laboratories, Inc.** Under the plan, Allied stockholders receive Dow common stock on the basis of 2/3 of a share of Dow stock for each share of Allied stock. Approximately \$400,000 worth of Dow stock is involved. Allied continues to operate under its present officers as a division of Dow. No change in personnel or operating plan is contemplated by Dow.

Wallace & Tiernan, Inc., bolstered its Maltbie Laboratories Division by merger with

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Check 2371 opposite last page.

AS CP'S EDITORS SEE THEM



Revolutionary chemical power plant to be fueled by sodium amalgam, air and water

A new fuel-cell-based process which converts sodium amalgam to caustic soda, producing substantial quantities of usable electric power in the process, has been announced by The M.W. Kellogg Co. of New York. Intriguing possibilities are seen for chemical industry use.

Cell is derived from original discovery in 1953 by Yeager and co-workers at Western Reserve University. Present design uses Electric Storage Battery Co. electrodes. Nearly 60% energy conversion efficiency is attained at atmospheric pressure and about 140°F. As to cell geometry, Kellogg states, "among most successful designs tested is a concentric tube arrangement in which cylindrical anode is positioned within cylindrical cathode,

with small gap for electrolyte."

Within cell, dilute amalgam (sodium in mercury) flows down the outside surface of the inside of cylindrical tube, the film forming the anode active surface. A portion of sodium content is stripped from film, with depleted amalgam falling to cell bottom for removal and replenishment.

Oxygen gas (air can be used for industrial models, Kellogg says) is injected into hollow cathode, one surface of which is sintered metal or carbon porous plate.

Cell is activated by connecting electrical load across anode and cathode. Reaction ceases automatically upon disconnection.

In Kellogg cell "process", depleted amalgam from cells is pumped through sodium-con-

centration sensing device which controls addition rate of make-up sodium metal — a step generating heat removed by exchangers. Re-constituted amalgam is pumped through electrical insulator device to cells.

Concentrated electrolyte leaving cells contains more exothermic-reaction heat, which is removed by additional exchangers. Solution next passes through concentration sensors which regulate amount of excess electrolyte bled from system and make-up water added to maintain equilibrium sodium hydroxide concentration in the recycle electrolyte.

Kellogg is proceeding under a \$34-million contract to design and test a 100-hp (75-kw) Navy prototype unit.

Soviet Bloc and Red China technical translations haven't been cut back, says Commerce Dept's John C. Green, only channeled to more specific targets. Instead of cover-to-cover abstracting of 100 journals, new program calls for selective abstracting of about 200. Six subject areas are to be covered, with an estimated 150 abstracts/month on "chemistry, chemicals, and chemical products."

All semi-works processing equipment is mounted on skids for quick interchangeability by lift truck in new inorganic chemical development facility of Metal & Thermit Corp. at Rahway, N.J. Alternate units are stored outdoors.

Nearly half of the chemical industry's then 36,000 engineers were in production work January 1959, according to National Science Foundation survey. Breakdown: Production 16,400 (45%), R&D 9600 (26%), management 3700 (10%), "other" 6900 (19%).

Expect vastly increased plastics storage & delivery facilities

To quickly meet rising volume demands from users of plastics fabricating compounds, synthetic resin manufacturers increasingly face a new kind of pressure: Big-scale logistics. In a recent statement about polyethylene, Union Carbide Plastics' president R. K. Turner said: "The increas-

ingly competitive situation has led us to take a number of steps to better serve customers. Heavy capital investment has been required to provide storage at suitable locations across the country and to make available special means of transporting bulk res-

in . . ."

Increased demand for polymerization-grade propylene may result in local pinches that refiners can meet only by "diverting propylene rich streams from polymer gasoline production (and upset available) distillation capacity needed for purification." So says Stanford Research Institute in their latest Chemical

Economics Newsletter, which also reveals that, in 1959, polyurethanes consumed more (70-90 MM) lb of propylene than did polypropylene (21 MM), with biggest outlets being isopropyl alcohol (1048 MM) and detergents (714 MM) — neither of which is expected to change very rapidly.

On the air and water pollution front — At recent AIChE meeting in Washington, General Hull of MCA reasoned that if problems arise from desirable products, society may have to weigh pros and cons of accepting less desirable products in substitution. Surgeon General Burney, in commenting on present community responsibility for environmental health, termed system "obsolete," termed waiting for final harmfulness proof of various agents "suicidal." Professor McKee of Cal Tech opined: "It might be said we have entered the 'micro-chemical' stage of environmental health."

Chemical industry spent \$928 MM for R&D in 1959, up 56% over 1957. \$47 MM of this, or 8%, went into basic research. Industrial chemical firms spent a total of \$384 MM, says NSF.

"We have reached a stage in marketing where the customer is sensitive to anything that hints of restriction of free competition," said NY patent attorney Nelson Littel before Chemical Equipment Sales Engineers Association of NY. "So while selling, forget about patents, push instead features in terms of advantage to customers."

Complexities in nuclear field stemming from Government control are being used by industry "as an excuse for inactivity," complained retiring Atomic Industrial Forum president F. K. McCune, G-E VP. This, he declared, is "an indulgence that cannot be tolerated if we expect our competitive system to survive."

Our Growing Industry

From page 8

the R. J. Strasenburgh Company, an ethical drug firm. Under the terms of the merger, Strasenburgh stockholders will receive 400,000 pre-split shares of Wallace & Tiernan stock. The transaction, approved by stockholders, involved a 2 for 1 stock split by Wallace & Tiernan. Robert J. Strasenburgh II will head the combined division as president and will also serve as corporate vice president of Wallace & Tiernan. The move will make Wallace & Tiernan's pharmaceutical operations as important as the other two major divisions, Mechanical Equipment and Chemical.



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Installed at the Hawaiian Cement Company's new plant at Barber's Point, Oahu, you'll find a total of nineteen MIKRO-PULSAIRE Dust Collectors, four of which are pictured above.

Because it has no moving parts . . . internally or in the gas stream . . . the MIKRO-PULSAIRE has proved ideally suited to handling highly abrasive materials such as cement. Other features to be considered are its record of 99.9% plus recovery, and high air-to-cloth filter ratio. Our Hawaiian installation provides a total filtering capacity of 329,928 cfm. Whatever your requirements, the MIKRO-PULSAIRE can deliver a top job for you, economically and with maximum dependability.

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Check 2372 opposite last page.



As part of a major plastics expansion program, W. R. Grace & Co. is increasing by 50% its production facilities at the Baton Rouge, La., high-density polyethylene plant and adding to the Polymer Chemicals Division's product line a complete range of polystyrene resins as well as a full span of low-and medium-density polyethylene resins.

Stauffer Chemical Company and Hewitt-Robins, Inc. are forming a jointly-owned company to be known as Stauffer-Hewitt, Inc. The new company will manufacture and sell polyurethane foam materials.

Stauffer will own 2/3 of the new company which will purchase the assets of Hewitt-Robins' urethane foam division. Manufacturing plant and headquarters are located at Franklin, N.J.

Residuals from Crown Zellerbach Corporation's pulp and paper mill at Bogalusa, La., are now being utilized by two new chemical plants recently put into production. The facilities can produce up to 10 million lb/yr of dimethyl sulfide, 5 million lb/yr of dimethyl sulfoxide and 1 million lb/yr of methyl mercaptan. They are the largest installations operated by the company's Chemical Products Div.

The Bogalusa plants utilize black liquor from the kraft recovery system, converting a portion of the lignin—one of

Our Growing Industry

the principal components of wood—to dimethyl sulfide.

Tennessee Oil Refining Company, division of Tennessee Gas Transmission Company, enters the petrochemical field with the awarding of contracts for installation of aromatics production facilities at its Chalmette, La., crude oil refinery.

Complex, to be completed by mid-1961, includes facilities for the production of benzene, ethylbenzene, orthoxylene, mixed xylenes and toluene. Contracts for the installation of the 6,000 bbl/day catalytic reformer and the orthoxylene unit, capable of producing 22 million lb/yr, have been let to the **Bechtel Corporation**.

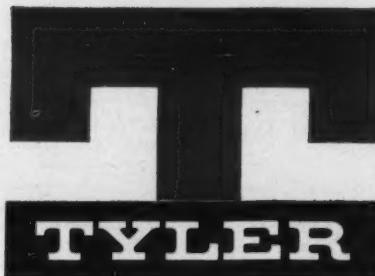
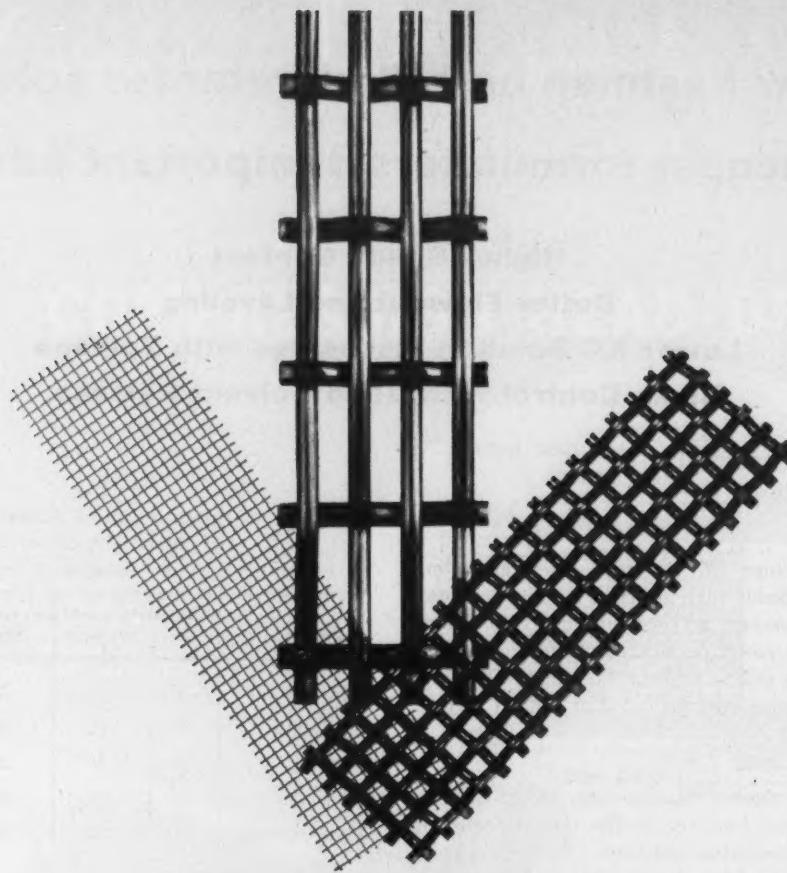
Badger Manufacturing Company has been awarded contracts for the extraction unit, which will have a capacity of 2200 bbl/day of benzene, toluene and xylenes, and for the 20-million-lb/yr ethylbenzene fractionator.

Sodium sulfate capacity of the **West End Chemical Company**, division of Stauffer Chemical Company, will be boosted to 200,000 tons/yr early this summer, when construction of an additional production unit at Westend, Calif., is completed.

Monsanto Chemical Company has put on stream a new unit at Monsanto, Ill., for the manufacture of 2,4-D and 2, 4, 5-T esters.

Borden Company and the **United States Rubber Company** have acquired an 850 acre site near Geismar, La., for the construction of a \$50 million complex of chemical plants to convert hydrocarbons into more than a dozen chemical products. Option price for the site was approximately \$1,190,000.

The site will be utilized by jointly-owned **Monochem, Inc.**, for a major chemical manufacturing unit using hydrocarbons as a starting point for the production of acetylene and vinyl chloride monomer. In addition, Borden and U.S. Rubber will erect adjacent



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Check 2373 opposite last page.

New Eastman high-flow retarder solvent offers lacquer formulators 4 important advantages

Higher Solids Content

Better Flowout and Leveling

Lower NC Solution Viscosities with Toluene

Blush Control with Good Solvent Release

Methyl isoamyl ketone (MIAK) is a new high-boiling solvent with remarkably high solvency for nitrocellulose, cellulose acetate butyrate, acrylics and vinyl copolymers. Its unusual solvent power permits you to formulate high solids lacquers that exhibit superior flowout and leveling. Its solvency is greater even than that of n-butyl acetate. (See table at right)

MIAK has a high toluene dilution ratio (4.1). Of even greater significance, however, is the low viscosity of MIAK/toluene-nitrocellulose solutions. As the graph at right indicates, the viscosity of such solutions is lower than that of 2-ethoxyethyl acetate/toluene or even methyl isoamyl ketone/toluene solutions.

With an evaporation rate of 0.55, MIAK is slow enough to provide excellent blush control, yet not so slow as to delay sanding and rubbing operations.

Another point, MIAK has a mild ester-like odor, much more pleasant than the characteristic odor of the higher ketone solvents.

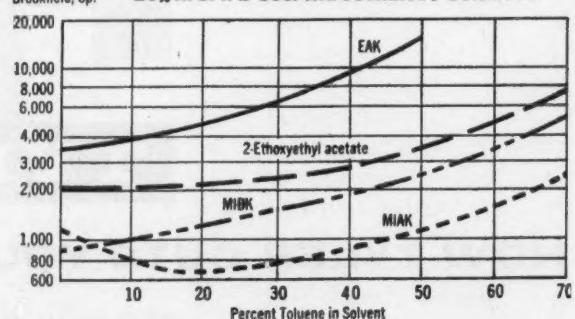
Investigate this new high-flow, retarder solvent in your formulations. Its cost per gallon is competitive with most other retarder-type solvents. Write for a sample of methyl isoamyl ketone and Technical Data Sheet M-105.

Comparison of Solvent Power of MIAK with Other Solvents

Viscosity, cps. @ 25° C.

Solvent	Evaporation Rate	10% 1/2 Sec.R.S. Nitrocellulose	10% Half-Second Butyrate	20% Acryloid B-82 Resin	20% VYN Copolymer
MIBK	1.6	30	23	15	138
n-Butyl Acetate	1.0	44	36	26	GEL
MIAK	0.55	44	33	21	188
Ethyl Amyl Ketone	0.3	86	Ins.	28	286
2-Ethoxyethyl Acetate	0.2	122	68	50	Ins.

Effect of Toluene on the Viscosity of 20% R. S. 1/2 Sec. Nitrocellulose Solutions



MIAK

Eastman high-flow retarder solvent

Eastman CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; Atlanta; Boston; Buffalo; Chicago; Cincinnati; Cleveland; Detroit; Greensboro, N. C.; Houston; Kansas City, Mo.; New York; Philadelphia; St. Louis.

Western Sales Representative: Wilson & Geo. Meyer & Company, San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

Check 2374 opposite last page.

individually-owned plants which will use the Monochem output for the manufacture of other chemical products.

Monochem initially will have a capacity of more than 80 million lb/yr of acetylene and approximately 150 million lb/yr of vinyl chloride.

A 30-million-gal/yr benzene plant will be built by Texaco, Inc. at Port Arthur, Texas. The new plant is expected to help meet the increased demand for high-purity benzene and free domestic chemical companies from dependence on overseas sources. The plant is expected to go on stream the second quarter of 1962.

Amoco Chemicals Corporation expects to complete this year at Texas City, Texas, new facilities which are expected to double hydrocarbon-resin capacity.

Latest entry in the chemical processing field is the Borane Chemical Corporation, a newly formed subsidiary of Lasco Industries, Inc., maker of plastic pipe and translucent building panels. Construction has been started on a 5000-sq-ft research laboratory and plant capable of producing two million lb/yr of synthetic polymers and chemical intermediates, on a 4½-acre site at Montebello, Calif.

Michael N. Gilano and Irvin W. Martenson, co-founders of the company with Lasco, which owns 51%, will serve as president and vice-president, respectively.

Swift & Company's technical department in Hammond, Indiana, has started construction of an addition to its epoxidation plant which will add eight million lb/yr to Swift's epoxidation capacity. Plant is expected to go into operation early this year.

An aluminum fluoride plant, costing approximately \$1,400,000, will be constructed by Kaiser Aluminum & Chemical Corporation at its Gramercy, La., works. Construction is to start by the middle of this year and be completed in the third quarter of 1962.

THAT'S
INTERESTING

Only



FALLS INDUSTRIES
INNOVATION
IN PREVIOUS GENERATIONS
Tube and Shell Exchangers

**Vanadium
from oil**

If a group of University of Utah scientists succeed in "mining" vanadium from crude oil, they will be producing a "silk purse" from a "sow's ear."

While vanadium is a commercially scarce metal, vital to jet and rocket manufacture, it is also a major headache for refiners.

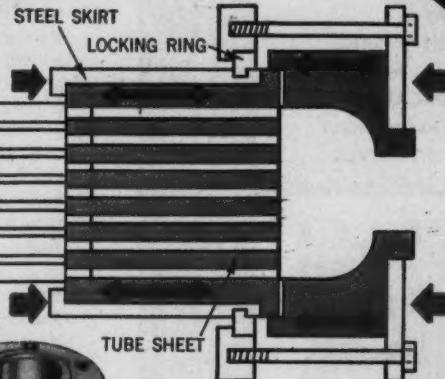
When vanadium-bearing crude is heated for distillation, the metal forms an extremely corrosive oxide that clogs tubes, eats into vessel walls and eventually forces shutdowns.

The project is being sponsored by the American Petroleum Institute.

For more information on product at right, specify 2375 see information request blank opposite last page.

Tube sheet damage due to mechanical shock is eliminated because the tube sheet is held in compression. The tube sheet is armed with a steel skirt. This skirt permits the bolting force to be applied against the face of the tube sheet, thereby holding it in compression. The resulting side shear in the end caps depends upon the physical properties of the tube sheet material, possesses an inherent safety factor and minimizes the potential effects of thermal shock.

COMPRESSION HEAD DESIGN



**STANDARD
MODELS**

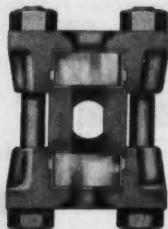
SHELL DIA. (IN.)	TRIANGULAR PITCH TUBE SPACING ^a	NO. OF TUBES	EFFECTIVE SHELL SIDE TRANSFER AREA (SQ. FT.) (Calculated For Standard Tube Lengths)					
			4½"	6"	7"	12"	14"	16"
6	Open	7	12	15.7	24	32
	Close	9	13.2	17.7	26.5	35.3	41.2	47
8	Open	14	20.4	28	42	56	64	73
	Close	19	28	37.2	56	74.5	87	99.5
10	Open	24	35.3	48	72	96	110	126
	Close	31	45.6	64	96	128	141	162
12	Close	42	52	123	164	192	220	
	Open	31	64	96	128	141	162	
14	Close	42	62	123	164	192	220	
	Open	38	74	112	148	174	199	
16	Close	64	125	188	250	292	335	
	Open	55	108	162	216	252	288	
18	Close	85	166	250	332	388	445	
	Open	74	145	218	290	339	387	
20	Close	109	214	320	427	500	570	
	Open	92	180	270	360	420	481	
22	Close	130	255	383	510	595	680	
	Open	121	236	356	472	554	634	
24	Close	163	320	480	640	745	850	
	Open	151	296	444	592	690	790	
26	Close	197	386	580	772	900	1030	
	Open	170	323	500	666	778	890	
28	Close	235	460	690	920	1070	1230	
	Open	206	405	606	810	945	1073	
30	Close	268	525	790	1050	1230	1400	
	Open	241	472	710	944	1100	1260	
34	Close	349	645	1025	1370	1600	1830	
	Open	316	680	990	1240	1445	1650	
38	Close	459	840	1290	1720	2010	2300	
	Open	408	962	1200	1600	1845	2140	

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Check 2376 opposite last page.



Spotlight On People

Three Air Reduction divisions merged with Milne as president

G. R. Milne is the president of Air Reduction Chemical and Carbide Company, newly-created division of Air Reduction Company. The new division was created by consolidating Air Reduction Chemical Company, Colton Chemical Company and National Carbide Company.

Move is expected to give Air Reduction a stronger competitive front, increased marketing strength and more effective coordination of the company's activities in the industrial chemical field.

Other officers of the division are: **B. R. Krashin**, vice president-marketing; **R. T. Lund**, vice president-operating; **R. A. Speck**, vice president-distribution; **J. M. Tinnon**, vice president-engineering; **F. E. Evers**, controller. **C. J. McFarlin**, president of Air Reduction Chemical Company, has joined the corporate forward planning group.



Moseley



Mahoney

George B. Moseley has been appointed vice president-marketing, a new corporate position, by Celanese Corporation of America. Moseley will coordinate marketing of the expanding family of Celanese chemicals, fibers, plastics and polymers.

J. D. Mahoney, director of marketing for Mobay Chemical Company, has succeeded **J. R. Eck** as president of Mobay. Eck, president and chairman of the board of Mobay since March, 1958, will rejoin Monsanto Chemical Company as assistant general manager of its Plastics Division.

Mahoney has been in charge of marketing functions for Mobay, formed in 1954 as a

jointly-owned associate company of Monsanto and Farbenfabriken-Bayer AG of West Germany.

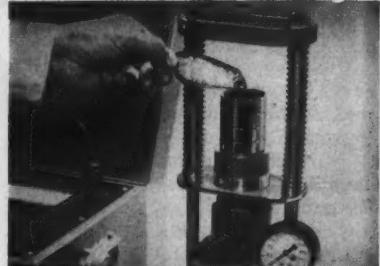
Neal M. Draper has been appointed vice president of Allied Chemical's National Aniline Division. He will direct sale of National Aniline's organic chemicals and dyestuffs and pigments.

Mallinckrodt Chemical Works is currently being reorganized along divisional lines, three new divisions, Industrial, Medicinal and Nuclear, being formed.

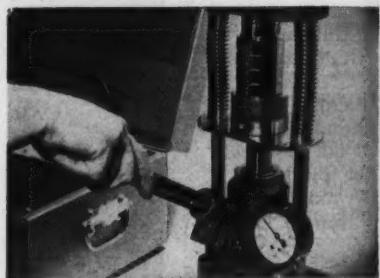
Within the new organization, marketing, research and product development activities necessary to the operation of each division will be overseen by a vice president and general manager. Manufacturing and general service functions common to all divisions including chemical control, accounting, packaging and warehousing will not be divided along divisional lines.

The division heads are: **Frederick M. Belmore**, recently appointed vice president, Industrial Division; **John E. Gaston**, vice president, Medicinal Division; and **Dr. Charles D. Harrington**, another recently appointed vice president, Nuclear Division.

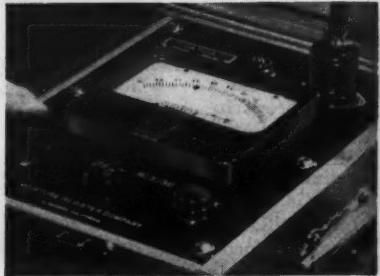
Carl A. Gerstacker, chairman of the board of Dow Chemical Company, is the new president of the Synthetic Organic Chemical Manufacturers Association. Other SO-CMA officers are: first vice president, **Chester M. Brown**, president, Allied Chemical Corporation; second vice president, **Arthur P. Kroeger**, as-



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Check 2377 opposite last page.

CHEMICAL PROCESSING

PEOPLE

sistant general manager, Organic Chemicals Division, Monsanto Chemical Company; treasurer, Robert L. Bateman, manager, Marketing Services, Union Carbide Chemicals Company, Union Carbide Corporation.

Harold C. Harsh succeeds Dr. Leopold F. Eckler as general manager of the Anasco Division of General Aniline & Film Corporation. Dr. Eckler recently was appointed group executive in charge of both the Anasco and Ozalid Divisions.

John K. McKinley has moved from manager of commercial development processes in Texaco's Research and Technical Department to general manager of the company's Petrochemical Department.

Dr. Edgar E. Wrege has been appointed administrative assistant to President Herschel H. Cudd, Avisun Corporation, owned affiliate of American Viscose Corporation and Sun Oil Company.

First scientist to receive the rank of research associate in Wyandotte Chemicals Corporation's dual ladder promotion system is Dr. Lester E. Kuentzel. Earlier this year, Dr. Kuentzel received the Award of Merit of the American Society for Testing Materials for developing a system of coding absorption spectral data—utilizing IBM-punched card systems.

Dr. Donald M. Black has been appointed manager of development and market research for Diamond Alkali Company.

Dr. Thomas Gillespie has been advanced to the rank of associate scientist with the Dow Chemical Company. A physical chemist on the staff of Dow's Physical Research Laboratory, Dr. Gillespie is known for his work in latex rheology. Dow established the classification of associate scientist several years ago as a means of recognizing outstanding accomplishments in research.

Now! The LUNKENHEIMER BALL VALVE



Fig. 700-T

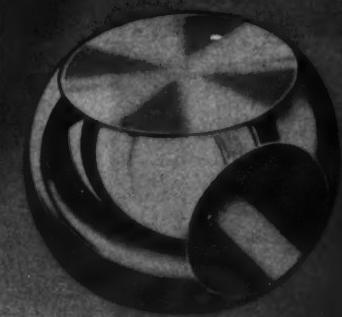
1/4" to 2" Screw Ends,
Bronze Body, Teflon
Seats and Seals.

Fig. 700-B

1/4" to 2" Screw Ends,
Bronze Body, Buna-N
Seats and Seals.

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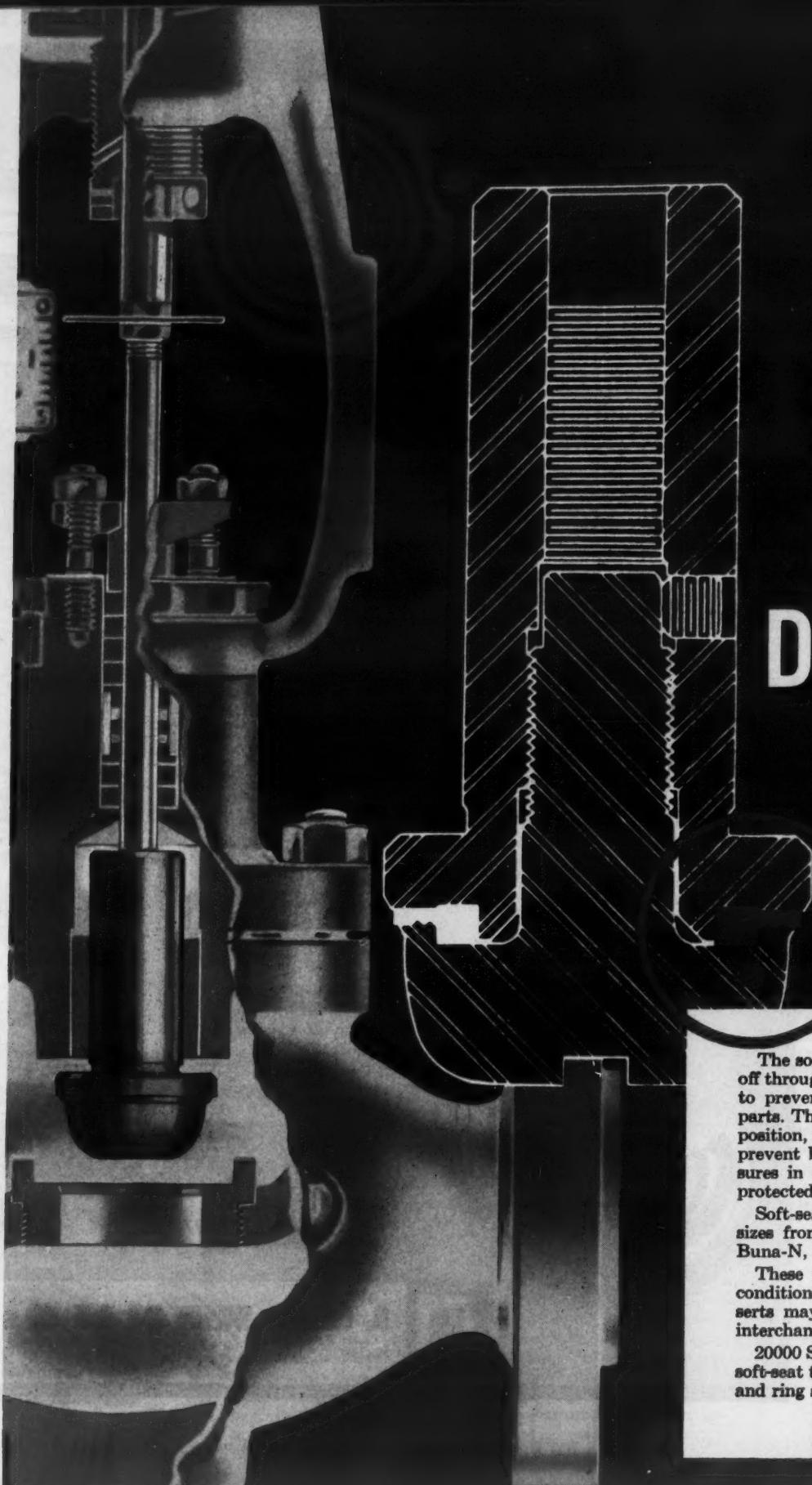
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Check 2378 opposite last page.



New Soft- Seat Design...

The soft-seat design provides tight shut-off through the normal flow path and a seal to prevent leakage through the threaded parts. The insert is fully retained in closed position, and is held with sufficient force to prevent blowout even at differential pressures in excess of 1000 psi. The insert is protected by metal-to-metal backup.

Soft-seat plugs are available in nominal sizes from 1" to 10". Inserts may be of Buna-N, Teflon or Glass Filled Teflon.

These materials are long lasting under conditions for which they are designed. Inserts may be replaced and materials are interchangeable.

20000 Series Valves may be converted to soft-seat trim in the field by installing plug and ring sets.

NOW!

The Advantages of 20000 Series Valves plus

TIGHT SHUTOFF

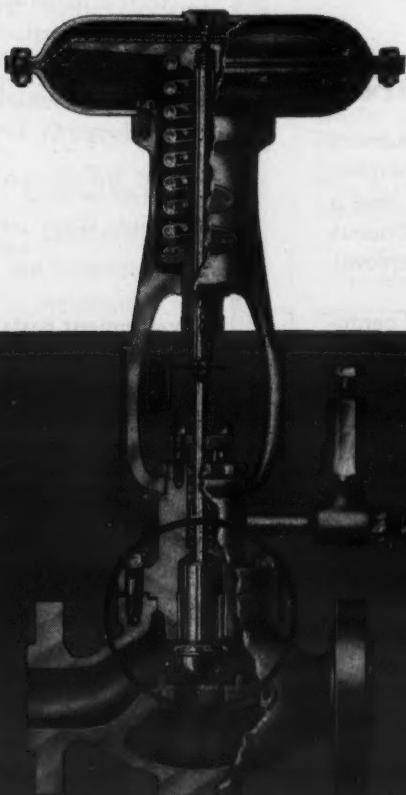
without Sacrificing Capacity or Characteristics

Now you can have high-capacity single-seated control valves with soft-seat tightness — without sacrifice of percentage characteristics. This design, moreover, permits static pressures and pressure drops up to 500 psi.

Soft-seat inserts of several materials are available to meet varying conditions. For example: *Buna-N* for temperatures to 200 F; *Teflon* for temperatures to 300 F and resistance to chemicals; *Glass Filled Teflon* for temperatures to 500 F, for

high-mechanical strength, corrosion resistance and for steam service. Metals available are identical with those normally used in metal-to-metal seating.

This new trim is a logical extension of the versatility inherent in the 20000 Series, designed to meet the growing preference for single-seated control valves. If you do not yet have information on the most versatile control valves available, ask a Mason-Neilan representative or write —



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more information
on product at
left, specify 2379
see information
request blank
opposite last page.



6

XU



letters from readers

The reluctant politicians

Sirs:

You are entirely right in stating that the participation of businessmen in politics is long overdue.* I have realized that for many years, but have been unable to convince many of my friends in other firms that it was necessary.

I find, however, that when some adverse legislation is threatened in the legislature or in Washington, the ones who were most reluctant to join up are the first ones to ask for assistance. I congratulate you on your story.

GEO. R. DEMPSTER
President
Dempster Brothers, Inc.
Knoxville, Tenn.

Information retrieval

Sirs:

It seems to me that you have chosen some excellent examples in covering this complex subject (information retrieval). (See "Facts and figures everywhere," Dec. CP, p. 29.) I . . . appreciate the notice you have given of work we have done here at SK&F.

HENRY C. LONGNECKER
Manager
Science Information Department
Smith Kline and French Laboratories

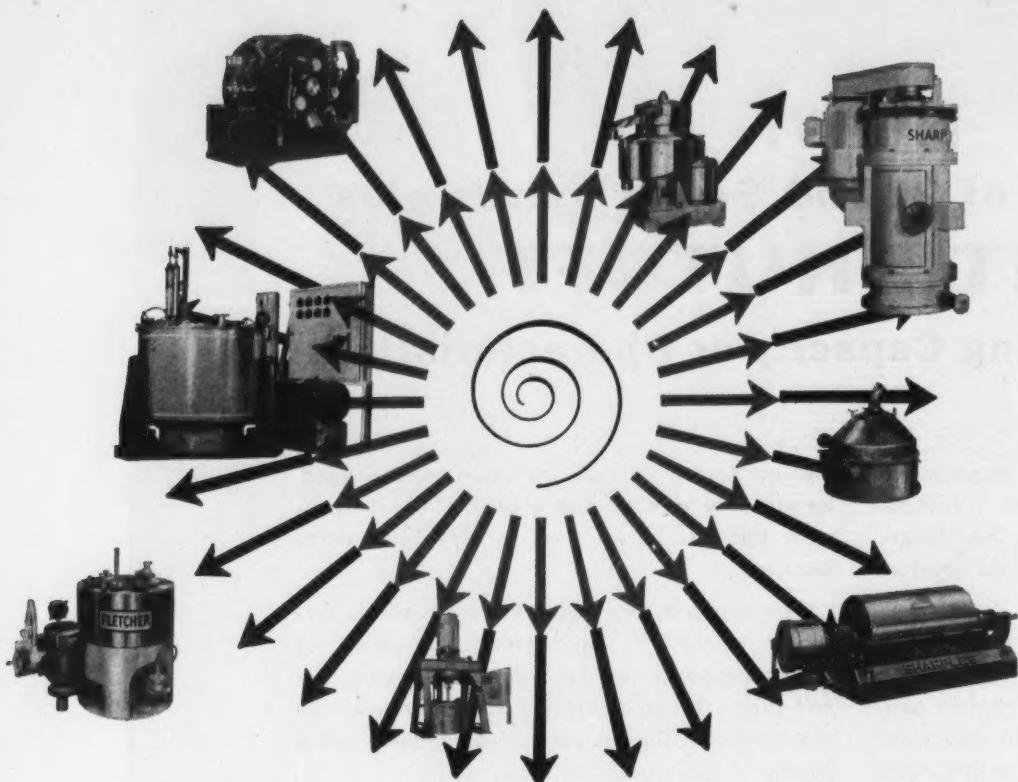
Development costs

Sirs:

I am delighted with the treatment you gave my article on the reduction of research and development costs. (See "Check the rising cost of commercial chemical development," Dec. CP p. 32). This is the best arranged and illustrated article that it has ever been my good fortune to prepare.

HOYT M. CORLEY
Manager
Market Research Department
Armour Industrial Chemical Company

*See "Businessmen ARE in politics whether they want to be or not," September CP, p. 27.



CENTRIFUGAL SKILL AT WORK

The entire scope of the chemical processing industry comes within the realm of centrifuges by Sharples. For at Sharples, and only at Sharples, do you have a choice of selection from a complete line of continuous centrifuges for the separation of liquids, and removal, recovery and classification of solids.

An important factor behind Sharples' line of centrifuges is Sharples' recognized skill in effective control of centrifugal force. Acquired through the years, this technical and highly involved skill is today evident throughout the entire line. And, because of it, you cannot help but add profits to your processing.

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Check 2381 opposite last page.

LETTERS

Creativity and survival

Sirs:

I should like to congratulate you on the emphasis you are placing on the subject of creativity.* It is a most difficult thing to bring into focus. We are, as a nation, so inclined to view technology as creativity when, in fact, it is no more than a comparatively simple extension of a basic process. We are grossly defective in creativity and truly magnificent in terms of our technology.

The creative background for our technology has, however, been borrowed from abroad, and when this source dries up our technology will suffer. I hope that your emphasis on the subject will bring about conferences and help to force some recognition on the part of Government toward this all-important subject.

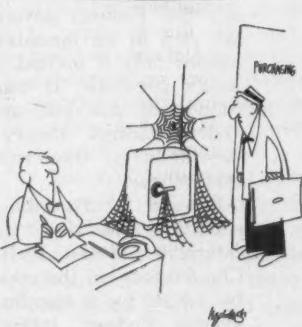
DR. GUSTAV J. MARTIN
Director of Research
William H. Rorer, Inc.
Philadelphia

Sirs:

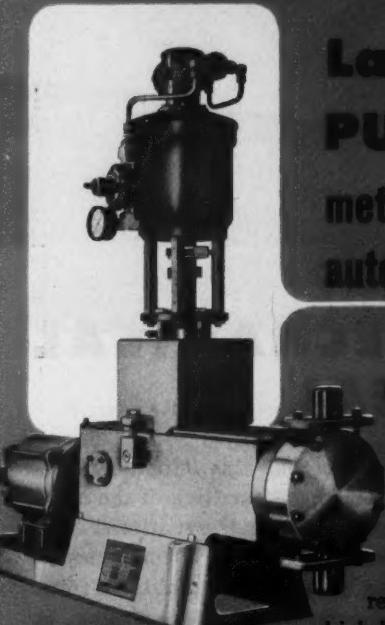
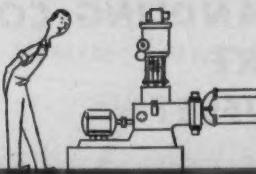
I have read the creativity article* with a great deal of interest and have also passed it around to my colleagues. This is indeed a thought-provoking article.

GLENN T. SEABORG
Chancellor at Berkeley
The University of California

*See the following CP articles in the series, "Creativity and Survival": "Is creativity lacking in industrial chemical research?", Oct., p. 25; "How industrial chemical research organizes for creative drive," Nov., p. 43; "How does industry stack up in basic chemical research?", Dec., p. 36; "Identifying creative researchers aim of personnel research," p. 33 in this month's issue.



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It's strictly hands off with automated Pulsafeeders working in your process. These dependable pumps give you automatically controlled metering of liquids. They do it accurately and without resort to constant level controls, high-head tanks, measuring tanks or stuffing box pumps.

Here's how it works: A pneumatic or electronic instrument senses a change in the process condition. It then sends a signal to the Pulsafeeder, which interprets the signal and corrects its pumping rate automatically.

When liquids must be metered in proportion to changing process conditions—and in heavy production service—you can depend on the Lapp Pulsafeeder . . . the trouble-free automatic metering pump!

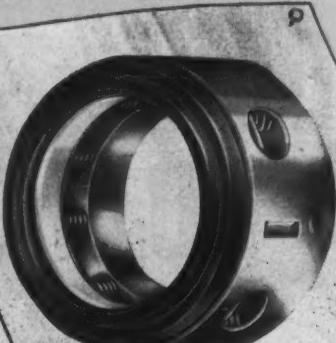
A NOTE on your letterhead will bring you Catalog 59 quickly. This new, complete, 28-page data book is chock-full of information on applications, specifications and descriptions of Pulsafeeders of a multitude of capacities and constructions. Write today . . . Lapp Insulator Co., Inc., Process Equipment Div., 1314 Poplar Street, LeRoy, New York.



Check 2382 opposite last page.

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Type 9 MECHANICAL SEAL

Performance records plainly prove that this "John Crane" development has successfully solved the handling of the most difficult corrosive liquids and gases. Where conventional type seals had failed, the Type 9 has done the job. It continues to answer new problems, including temperature conditions from -120°F. up to 500°F.... pressures to 150 psi. (to 750 psi. in balanced construction).

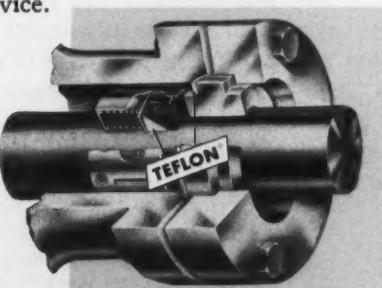
Designed to withstand practically all chemicals, the Type 9 incorporates a flexible wedge ring and sealing ring molded from DuPont's Teflon. It is engineered for the particular application and can be furnished in the metallurgical specification best suited to the service.

Use the Type 9 on all rotating shaft applications: centrifugal, rotary pumps, mixers, agitators, digester circulating pumps, other equipment.

Can be supplied in double seal construction where required.

Get complete information on the Type 9 Seal from Crane Packing Co., 6421 Oakton St., Morton Grove, Illinois, (Chicago Suburb). In Canada: Crane Packing Company, Hamilton, Ont.

*DuPont trademark



CRANE PACKING COMPANY

Check 2383 opposite last page.



Watching Washington

Legislative Battle Looms Over Water Pollution

Industry, Congress and public-health groups are taking a careful look at proposed and pending water-pollution legislation. Bills have been introduced and are planned for introduction by four U. S. Senators and Representatives. Some of these are similar to the water-pollution control act passed last session, but vetoed by President Eisenhower.

That act would have increased Federal matching funds for sewage-disposal plants from \$50 million to \$90 million per year. Two republicans, Senator Case of South Dakota and Rep. Cramer of Florida, are introducing amendments to strengthen the Water Pollution Control Act of 1956.

Senator Kerr of Oklahoma and Rep. Blatnik of Minnesota are introducing legislation calling for increased Federal funds to help build municipal sewage-disposal plants.

It was at the 1960 National Conference on Water Pollution, Washington, D.C., that the legislators made known their plans. Senator Kerr said he would introduce a bill broader in scope than the one by Rep. Blatnik which Pres. Eisenhower vetoed.

State Control Is Defended

However, it is the new Blatnik bill that most deeply interests observers here. Blatnik wants legislation to expand Federal authority to order pollution abated on all navigable waterways. At present, the Federal government can step in on intrastate situations only if invited by the state's governor. It was discussion of this bill, and the Federal-control theory that surrounds it, that split the conference.

Edward R. Thornton, representing the New England Interstate Water Pollution Commission led the opposition by asking for a standing vote against Federal intervention

on purely intrastate pollution. Said Thornton: "We have no pollution problems in New England that require additional Federal help; enforcement is the primary concern of the state."

Thornton was supported in this view by Albert E. Forster, president and board chairman of Hercules Powder Co. He urged that pollution control be considered on a state level "with funds, manpower and dedication as important as highways and schools."

Leading opposition to the state-control advocates was Dr. Ira N. Gabrielson, president of the Wildlife Management Institute. Gabrielson was not at the meeting, but in a message he contended that state-control programs are "hampered by the unwillingness, reluctance or inability of the legislative bodies to provide necessary appropriations."

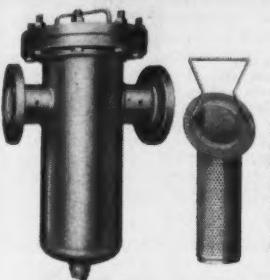
How was the vote? About 70% of the delegates rose in favor of Thornton's resolution; roughly 5% opposed it.

The Public Health Service estimates that it will take \$10.6 billion to clean up America's rivers and streams in the next ten years. About half of this must come from industry, according to Surgeon General Leroy E. Burney. He says that pollution has increased six times in the past 60 years and is rising.

New Problems Plague Public Health Service

Two recent thorns in the side of the Public Health Service are receiving careful attention. There has been a manyfold increase in the amount of synthetic organic

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FEBRUARY 1961

WASHINGTON NEWS

chemicals as pollutants in the past few years. The cumulative effects of these agents on health are not yet known. The PHS points out that production of synthetic organics has increased 33 times in the past 20 years.

Also, radioactive material in measurable quantities is a new — potentially dangerous — pollutant, says PHS. So far, radioactivity levels appear to be below those that would threaten health. The PHS, as well as the Atomic Energy Commission, is, however, supporting continuing studies of several streams, especially the Columbia River, where radioactive pollution appears to be the heaviest.

One leading educator believes the dumping of radioactive wastes into the ocean to be "the most serious potential danger to our long-range health as far as water pollution is concerned."

Dr. Chauncey D. Leake, dean of the College of Medicine of Ohio State University, and past president of the American Association for the Advancement of Science, called attention to the concrete containers in which radioactive wastes are packed for dumping. Says Leake: "We know from studying concrete pilings that these containers will go to pieces in sea water."

**AEC Security Ease-up
In Gas-centrifuge Field?**

The Atomic Energy Commission is studying reaction to a proposed new rule which would make it easier for industry, especially smaller firms, to enter nuclear technology areas.

This rule would extend the AEC's access-permit program to allow private industry to work in classified areas of the gas-centrifuge field. It would permit industry to use private funds and retain the results of its work in this area.

The AEC's proposed rule is the result of requests from the chemical-processing and nuclear-technology industries which believe that "there is substantial commercial potential in the use of the gas cen-

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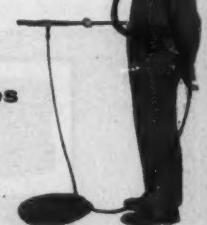
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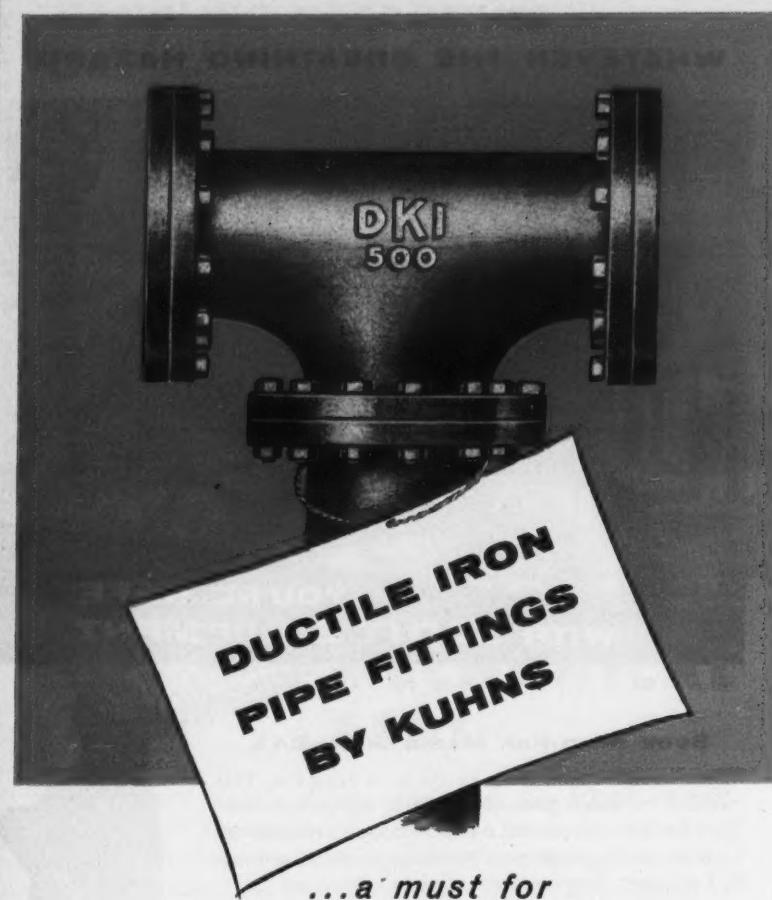


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Available in a wide selection of sizes in flanges and flanged fittings, screwed fittings, couplings and special purpose components, these rugged, long lasting "D.I." products assure extra years of service.

Simplify your maintenance problems and reduce operating costs with the fittings listed and pressure rated by the Underwriters' Laboratories, Inc.



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*Cast, ductile
and malleable iron fittings*

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WASHINGTON NEWS

trifuge to provide fuels for nuclear reactors."

Under the proposed rule, there would be established a new category of information in the access-permit program: "Isotope Separation-Gas Centrifuge Method." This program permits properly cleared persons to obtain access to restricted data which may be of value to private industry.

Here's What You Do To Get Data

Firms seeking access to classified gas-centrifuge data would be required to:

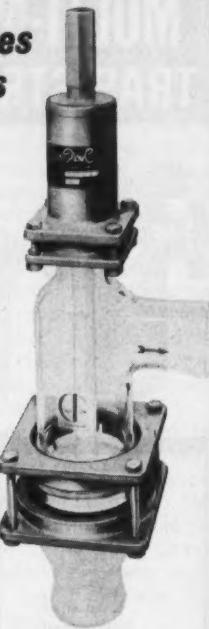
- 1) Demonstrate a capability and serious interest in gas-centrifuge development.
- 2) Report results of their work to the AEC.
- 3) Make all technical data available for AEC inspection.
- 4) Grant the Government, upon request, a non-exclusive, reasonable royalty bearing license.
- 5) Grant the AEC the right to use proprietary data in their programs.

The AEC is not as concerned as the press over the possibilities for nuclear weapons that the gas centrifuge process opens up for small nations. After a study, the AEC's conclusion is that "practical use of this method by any nation for producing weapons material is several years away." Further, AEC contends that it will take "thousands of gas centrifuge machines to produce material for weapons."

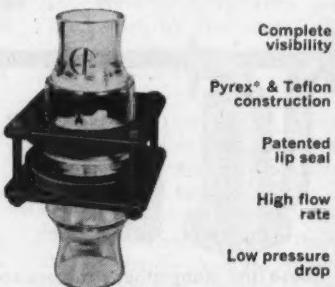
However, the Commission also sees several possible advantages of the gas centrifuge over other means of separating uranium isotopes. These are of particular interest to industrial organizations interested in producing fuel elements commercially. There is a lower requirement for electrical power, and the process requires fewer units in series in order to produce the desired enrichment of U-235. In addition, says AEC, the gas centrifuge appears especially well suited for low-capacity operations.

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Model R check valves operate in vertical position and give complete visibility and excellent corrosion resistance to all liquids except hydrofluoric acid and hot concentrated caustics. Available in sizes 1", 1½", 2" and 3"; adaptable to any pipe installation with 150 lb. ASA companion flange. *T.M. Corning Glass Works

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CHEMICAL PROCESSING



recent books

Intended as a text book, "Advanced Organic Chemistry Third Edition" is, in the author's words, "largely restricted to those aspects of the science that seem to me to be inadequately treated in the other textbooks and reference books that are now available." Important changes made in the third edition include the introduction of such topics as electronic and nuclear magnetic resonance, conformational analysis, inclusion and charge-transfer compounds and the Hammett rho-sigma relations. Approaching the subject from a critical point of view, G. W. Wheland, the author, stresses the structural theory of organic chemistry.

To obtain "Advanced Organic Chemistry Third Edition" remit \$17.30 direct to John Wiley & Sons, Inc., 440 Park Ave., S., New York 16, N.Y.

Check 2388 opposite last page.

Unfired pressure vessels is a practical handbook for engineers, fabricators, inspectors and shop supervisors. The fourth edition is a fully revised and updated version of early work. The book has 154 pages, includes 66 tables, charts and diagrams. The author, Robert Chuse, is a commissioned inspector of the National Board of Boiler and Pressure Vessel Inspectors.

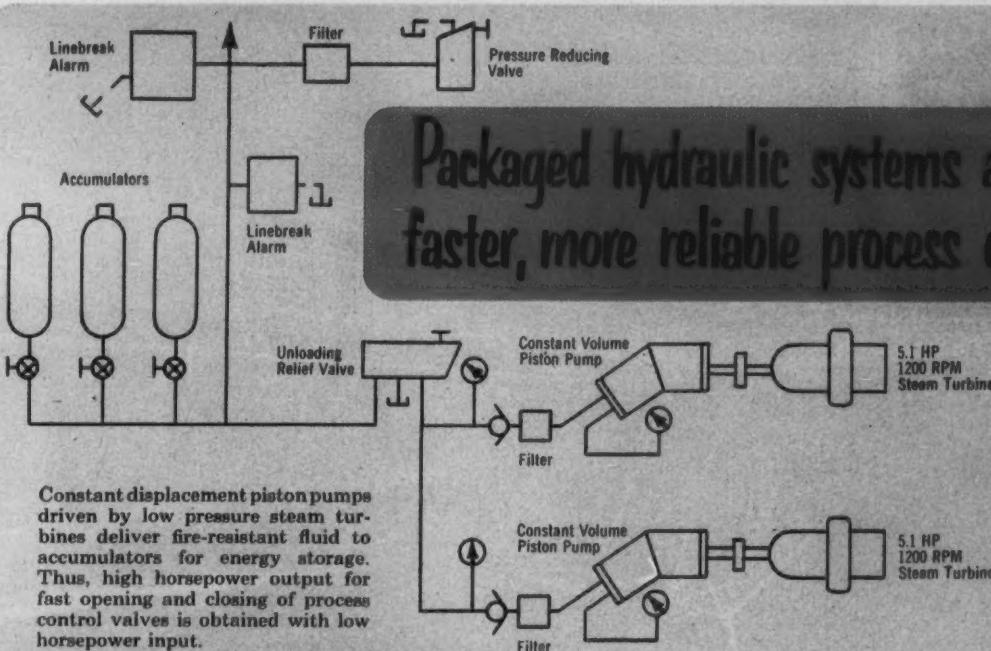
To obtain "Unfired Pressure Vessels" remit \$8.75 direct to F. W. Dodge Corporation, 119 West 40th Street, New York 18, New York.

Check 2389 opposite last page.

The 42nd edition of the "Handbook of Chemistry and Physics" is now available. This fact-filled volume of over 3400 pages has become one of the standard reference sources for those concerned with chemistry, physics and closely allied sciences. Over 200 collaborators who are recognized authorities in their own science research fields have contributed to this edition. Among the 22 new tables added to the handbook this year are the following:

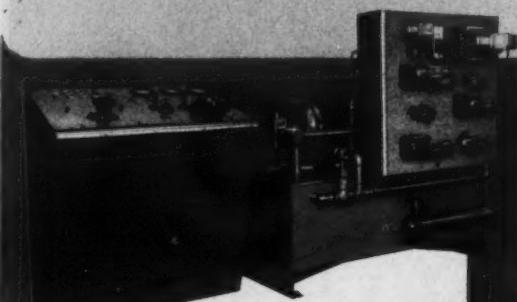
- Diffusion of Metals into Metals
- Interplanetary Orbits
- Components of Atmospheric Air
- Bond Links Between Carbon and Other Elements
- Sublimation Data for Organic Compounds
- Miscibility Tables for Various Organic Compounds
- Surface Tension of Organic Solutes in Water

In some cases, entire tables have been revised or expanded or updated. Among these are: Trade-

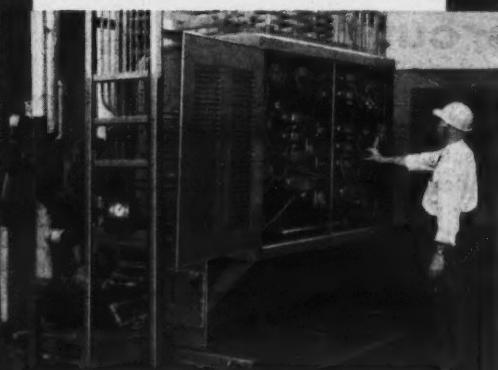


Packaged hydraulic systems assure faster, more reliable process control

Constant displacement piston pumps driven by low pressure steam turbines deliver fire-resistant fluid to accumulators for energy storage. Thus, high horsepower output for fast opening and closing of process control valves is obtained with low horsepower input.



Control console and power unit form electro-hydraulic system for controlling automatic heat treatment cycle. Physical layout provides optimum circuit efficiency, ease of servicing, and good appearance.



This power package includes all hydraulic pumps and valves for complete control of automatic cyclic operation of process in a butadiene plant.

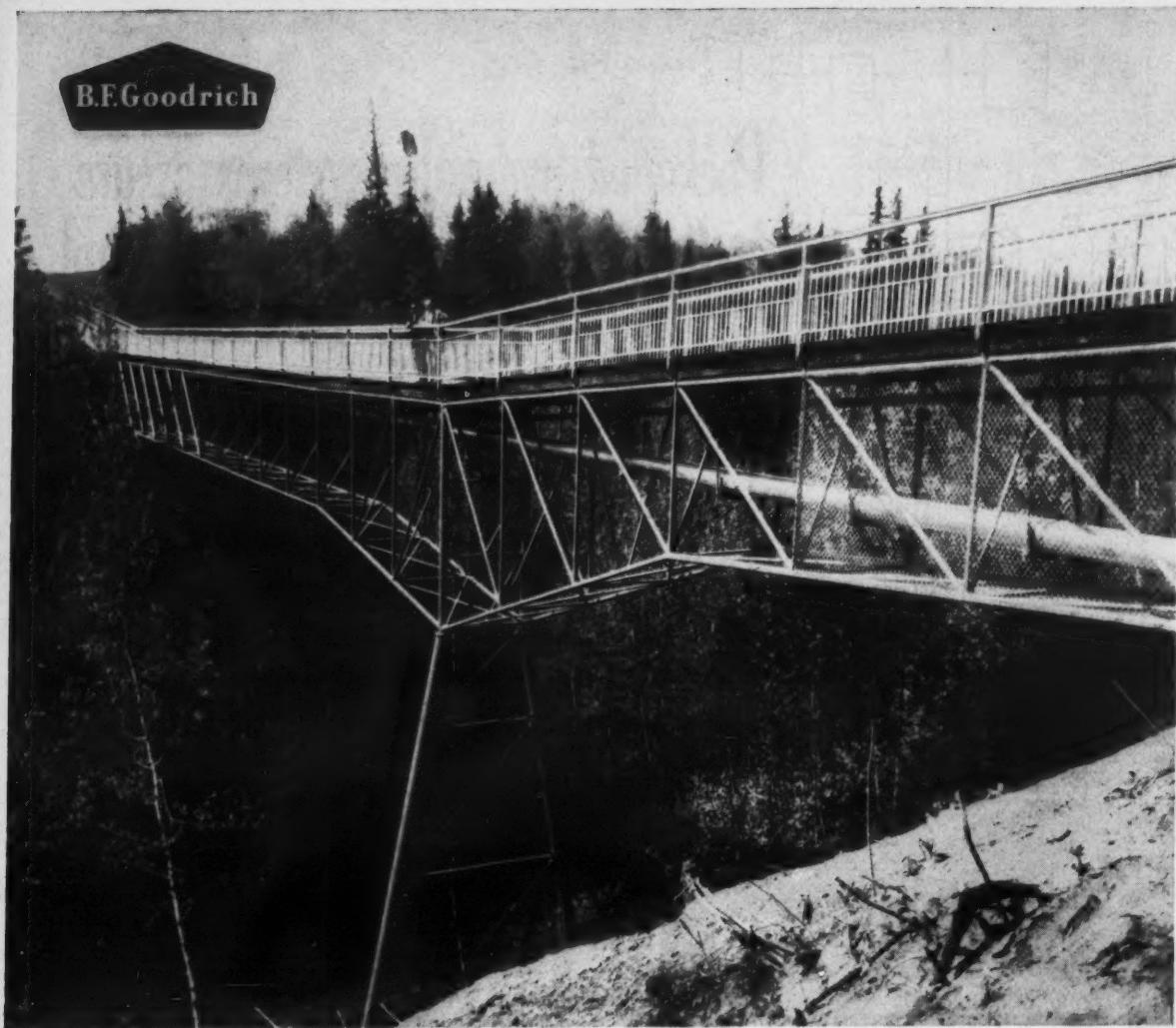
Fast and precisely controlled motions, having the high reliability demanded by modern processing, are inherent characteristics of hydraulics. In addition, these advantages are obtained at low cost, for you can cover your full range of operations—from valve control to power transmission—with standard Vickers components. Your engineers enjoy unlimited design flexibility through a choice of electric, electronic, pneumatic and manual signals to control the hydraulic pumps, motors, cylinders, and variable speed drives.

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Get more information on the job being done by Vickers packaged hydraulic systems in chemical, petrochemical, petroleum refining, and other processing industries by writing today for Bulletin I5802, "Packaged Hydraulic Systems for Process Control."

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This 10" pipe of Geon is extruded by Scepter Manufacturing Company, Ltd., Toronto. Because of low temperatures, it is insulated with Fiberglas and a thin coat of aluminum. It has operated successfully through winter temperatures as low as -30°F. B.F.Goodrich Chemical Company supplies the rigid Geon vinyl.

Pipe of rigid Geon lightens sewage system spans, cuts costs

This picture shows how city engineers of Edmonton, Alberta, solved a dual-design problem and saved money, too. Sewage piping was to be carried over rough terrain by spans also designed for pedestrian use. However, the extra weight of ordinary pipe would have required heavy structures, extra cost. By utilizing lightweight, 10" diameter pipe made of rigid Geon vinyl, the engineers were able to make the spans far less complex, far less costly.

At the same time, the pipe of Geon eliminates internal adhesion of sludge, sand or other material—eliminating

the cost of reaming pipe periodically to keep the system operating. Installation is fast and easy, too. Engineers are so satisfied that they are planning additional lines of even larger diameter pipe of rigid Geon vinyl.

Here's another way pipe of Geon cuts costs, makes possible new and improved solutions to problems. Geon is improving applications and making possible new products in many industries. For more information, write Dept. NJ-1, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. In Canada: Kitchener, Ont.

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RECENT BOOKS

names of Plastics; Analytical Reagents; Nuclear Spins; and Definitions.

To obtain "Handbook of Chemistry and Physics" 42nd Edition, remit \$12.00 direct to The Chemical Rubber Company, 2310 Superior Avenue, Cleveland 14, Ohio. Check 2392 opposite last page.

The chemistry and technology of fertilizers, a 692-page book edited by Vincent Sauchelli, discusses specific raw materials and their conversion to suitable chemical compounds for the feeding of crop plants.

Its 24 chapters are well illustrated with photographs, charts and drawings. Subjects treated include factors controlling preparation of conventional mixed fertilizers, theory and practice of drying and cooling fertilizers and corrosion control.

To obtain "Chemistry and Technology of Fertilizers" remit \$18.00 direct to Reinhold Publishing Corporation, 430 Park Avenue, New York 22, New York.

Soviet advancements in the technology of non-metallic coatings are discussed in 531-page book. Translated from the Russian and edited by E. Bishop, the work contains useful information not hitherto readily available on materials used in Soviet paint and finishes industry.

The book was originally published in Russia in late 1957, and was planned as a textbook for students of chemical engineering. Theoretical principles of corrosion control are covered. Modern equipment used for applying coatings are reviewed. Emphasis is placed on factory finishing methods and on machines for mass-production painting and drying.

To obtain "Technology of Non-Metallic Coatings" remit \$15.00 direct to Pergamon Press Inc., 122 East 55th Street, New York 22, New York.

Check 2393 opposite last page.

Cost Engineering in the process industries consists of articles originally written for a chemical trade journal by more than a hundred cost-engineering specialists. The 502-page book contains facts and data needed for making economical cost and profit-ability analyses in the process industries.

To obtain "Cost Engineering in the Process Industries," edited by Cecil Chilton, remit \$11.00 direct to McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, New York.



Shell Chemical's plant near Houston, Texas, is one of the largest petrochemical plants in the world. Shell Company is a division of Shell Oil Company, which is 65% owned by Royal Dutch/Shell

Foreign investment in U. S. CPI boosted to above \$2 billion

Activity is increasing, with 12 plants partially or wholly owned by companies from abroad being built within the past two years at a cost of more than \$200 million . . . and more planned for the future

By GORDON WEYERMULLER, Associate Editor, Chemical Business

THE \$12-MILLION polypropylene plant of Novamont Corporation, near Neal, West Virginia — 100% owned by Montecatini, the Italian chemical colossus — is slated to go on stream in the near future. The \$50-million plant of Fiber Industries, Inc., 50% owned by Imperial Chemical Industries — the largest manufacturing organization in Great Britain and the second largest chemical company in the world in terms of assets — started producing polyester fiber at a substantial rate in 1960 at Shelby, North Carolina. Farbwere Hoechst, West German drug giant, recently acquired Lloyd Brothers, pioneers drug company in Cincinnati, Ohio.

While each of these moves

taken by itself may not have major significance, all of them together, plus a number of others, form a pattern that warrants examination by chemical processing companies. Accompanying tabulation shows 25 major chemical processing companies in the U. S. that are wholly or partially foreign owned. Of the 82 plants covered, 12 have been built within the past two years at a cost of more than \$200 million.

Certainly, this activity has not reached the proportion of any stampede by overseas companies to build in the United States. Much of the growth has occurred over many years. Most companies with large investments in the

U. S. have been here for a long time.

It can be noted that the 25 companies shown in the table have sales of nearly \$4 billion and assets of more than \$3 billion, about \$2.4 billion of which is owned by companies outside the United States. This \$2.4 billion is about 3% of the total CPI investment in the United States of \$85 billion. More than \$800 million or 1/3 of the \$2.4 billion has been invested since 1954.

According to the U. S. Department of Commerce, about \$17 billion has been invested in foreign firms in the U. S., including corporate stock. Hence, the investment in the CPI represents a substantial portion of the total.

Main reason these foreign companies are building in the U. S. is the tremendous market in this country. In most cases, practically all of the products are sold here. However, such factors as readily available raw materials, low-cost utilities and easy access to transportation are considerations in locating a plant in the U. S.

One thing this trend does mean to American chemical companies is increased competition. It is one more factor that plays a part in the profit squeeze. However, a number of favorable factors are also present in this movement of chemical processing companies from overseas to the United States.

To next page



British-owned Bowaters Southern Paper plant at Calhoun, Tennessee, cost \$60 million; is now about double in size. Company, which also has a large plant at Catawba, South Carolina, is third largest manufacturer of newsprint in U. S.

Foreign investment in U. S. CPI

From preceding page

For example, the 25 companies listed in the table provide direct employment to more than 85,000 people as well as to many others whose jobs result from this activity. This can be compared to the total of about 2½ million people employed by the CPI in the United States. Also, these companies manufacture useful products, valuable for industrial or consumer applications. American chemical companies who are partners in joint ventures benefit from the use of foreign patents, processes and know-how.

The new secretary of commerce, Luther H. Hodges, believes that foreign investment should be attracted to this country. In fact, when he was governor of North Carolina, he headed a group of businessmen who toured Europe seeking new plants for their state.

ICI Entry Into U. S. Means Big-league Competition

The Fiber Industries plant is a good illustration of both the problems and benefits such ventures can present. This plant will manufacture a fiber, Fortrel, whose chemical com-

position and properties are much like those of Du Pont's Dacron. Participation of Imperial Chemical Industries in the project means that it is no small enterprise, but represents major competition for Du Pont. It means that Du Pont is now without a single "miracle" textile fiber which it is producing exclusively or almost exclusively on a large scale. (Du Pont is producing Lycra spandex fiber and Teflon TFC fluorocarbon fiber HT-1 on an exclusive basis although these are not made in a volume comparable to nylon or Dacron. Company has also made a host of fiber modification to nylon, Orlon and Dacron.) Du Pont's Dacron competition, however, comparatively minor in past years, will become of major proportions in 1961.

Also, it is evident that Imperial Chemical Industries does not intend to confine itself to this one operation. It has been reported that a number of other moves in the U. S. have been contemplated by ICI, and some of these will probably come about during the next year or two.

At one time, Du Pont and ICI had an agreement where-

by Du Pont would not manufacture in Europe if ICI did not manufacture in the U. S. Several years ago this agreement was terminated. Now Du Pont is going to western Europe, with \$30 million already invested, while ICI can be expected to move ahead rapidly in this country.

The ICI 50% ownership of Fiber Industries does provide an important advantage to Celanese, which owns the other 50%. Celanese will gain the benefit of technology on the polyester fiber which was originally developed by ICI and later licensed to Du Pont for the production of Dacron in the U. S. Celanese will also be the beneficiary of the extensive research program of ICI on polyester fibers.

Montecatini Will Make Further Moves In U. S.

Montecatini will also be expanding its operations and making further increases in its manufacturing facilities in this country. Production of polypropylene fiber is a distinct possibility and would be the next logical step in Montecatini's expansion in the United States.

The Farbwerke Hoechst acquisition of Lloyd Brothers is a good example of a foreign entry that could be of great benefit to consumers. Hoechst provided the first effective treatment of syphilis, the first local anesthetic, the first diphtheria serum antitoxin and an effective oral anti-diabetic agent, known as Orinase in this country. Acquisition of Lloyd Brothers will be a factor in permitting the U. S. public to benefit from future developments of this type in the early stages.

Lloyd Brothers, Inc. is one of three Hoechst manufacturing companies in the U. S., all of which are under the parent company, Intercontinental Chemical Corporation. The other two are Hoechst Chemical Corp., which is engaged in the manufacture of dyestuffs and chemicals; and Azoplate Corp., which produces presensitized plates.

Shell Oil represents a major chemical processing company, 65% foreign-owned, which is making many noteworthy contributions to the American chemical economy. One of these is polyisoprene synthetic rubber. Another is epoxy re-

To page 28

**MAJOR CHEMICAL PROCESSING COMPANIES IN THE U. S.
WHICH ARE PARTLY OR WHOLLY FOREIGN-OWNED**

Company	No. Plants In U.S.	Ownership	Country	Products	No. Employees	Annual Sales In Millions	Assets In U.S. In Millions	
							Total	Foreign Portion
American Enka	5	56% A.K.U.**	The Netherlands	Rayon, Nylon	6800	\$109	\$99	\$55
American Petrofina	3	Petrofina (minority)	Belgium	Petroleum products	1200	77	97	47*
American-Saint Gobain	3	100% Compagnie de Saint Gobain	France	Glass	2900	32	39	39
Bowaters Carolina Corp.	1	100% The Bowater Corp. of North America, Ltd.	Great Britain	Newsprint, Pulp, Hardboard	396	18	38	38
Bowaters Southern Paper Corp.	2	100% The Bowater Corp. of North America, Ltd.	Great Britain	Pulp, Printing papers	1265	56	123	123
Carling Brewing Co.	7	Over 99% Canadian Breweries, Ltd.	Canada	Beer, Ale	2800	150	65	65
CIBA	1	100% CIBA Limited	Switzerland	Pharmaceuticals, Dyes, Plastics, Chemicals	3000	66	40*	40*
Courtaulds (Alabama) Inc.	1	100% Courtaulds	Great Britain	Rayon	500*	10*	10*	10*
Dow Badische Chemical Co.	3	50% Dow Chemical 50% Badische Anilin	U. S. West Germany	Acrylic acid, Acrylates, Butyl alcohol, Caprolactam	150*	12*	6	3
Dunlop Rubber Company	2	Over 50% Dunlop Rubber	Great Britain	Rubber	2000	30*	30*	15*
Fiber Industries Inc.	1	50% Celanese 50% ICI	U. S. Great Britain	Polyester fiber	1200	50*	50	25
Hiram Walker & Sons, Inc.	3	100% Hiram Walker-Goodeham & Worts Ltd.	Canada	Liquor	3000*	50*	50	50
Harold F. Ritchie, Inc.	1	100% Beechams	Great Britain	Hair cream	170	8	10*	10*
Hoffmann-La Roche, Inc.	1	100% F. Hoffmann-La Roche and Co.	Switzerland	Pharmaceuticals, Fine chemicals, Aromatics	2800	65*	40*	40*
Intercontinental Chemical Corp.	3	100% Farbwerke Hoechst AG	West Germany	Pharmaceuticals, Dyestuffs, Chemicals, Presensitized Plates	600	10	9	9
Joseph E. Seagram & Co.	11	100% Distillers Corp., Ltd.	Canada	Liquor	6900	665	444	444
Lever Brothers	6	100% Unilever	Great Britain The Netherlands	Soap, Detergents, Other Products	7500	410	132	132
Metal Hydrides Incorporated	2	48% Ventures Limited**	Canada	Hydrides, Metals	165	6	3	1½
Mobay Chemical Company	2	50% Monsanto 50% Farbenfabriken Bayer AG	U. S. West Germany	Urethane chemicals, Polycarbonates	600*	20*	25*	12*
Novamont Corporation	1	100% Montecatini	Italy	Polypropylene	200*	8	12	12
Shawinigan Resins Corp.	2	50% Monsanto 50% Shawinigan Water & Power	U. S. Canada	Polyvinyl acetate, Other products	600	20	25*	12*
Shell Oil Co.	16	65% Royal Dutch/Shell**	Great Britain The Netherlands	Petroleum products, Chemicals, Synthetic rubber	38,000	1819	1767	1149
Toms River Chemical Co.	1	58% CIBA Limited 21% Geigy Ltd. 21% Sandoz Ltd.	Switzerland	Dyes, Epoxy resins	300	10	10*	10*
U.S. Borax & Chemical Corp.	3	74% Borax (Holdings) Ltd.**	Great Britain	Boron & potash compounds	2800	67	109	81
Verona-Pharma Chemical Corp.	1	Partly owned by Farbenfabriken Bayer AG	West Germany	—	—	—	—	—
Total	82				85,846	\$3768	\$3233	\$2423

*Chemical Processing Estimate

**For these companies, remaining portion of ownership is divided among a number of stockholders

TEFLON*
MECHANICAL SEALS
 in Chemical
 Processing



Garlock CHEMISEAL Mechanical Seals have operated for 27 months without downtime on sulfuric acid pumps (top) or scrubbing towers (lower left) at Kolker Chemical Corp.

Where others failed, Garlock CHEMISEAL[†] Mechanical Seals have provided over two years of trouble-free service on pumps handling 98% sulfuric acid.

Applied by the Kolker Chemical Corporation of Newark, New Jersey, the seals have maintained tight, leak-proof operation of pumps circulating the acid to scrubbing towers at a rate of 20 g.p.m. at an 80 ft. head. Latest reports show that the CHEMISEAL Mechanical Seals have operated around the clock for twenty-seven months without maintenance.

Ideal for this application, Garlock CHEMISEAL Mechanical Seals have remained unaffected by conditions of extreme corrosion, damaging abrasives, and temperatures that sometimes reach 100° C at the seal face during process upsets. This performance has helped guarantee uninterrupted processing, has helped protect the product from contamination and has substantially reduced the \$200 yearly cost that Kolker previously spent on replacement seals for a single pump.

Chosen by many leading processors like Kolker, Garlock CHEMISEAL Mechanical Seals offer a fine combination of benefits. They possess a great immunity to corrosion and contamination, offer long, useful life, and are more economical than many other designs. Good for all mediums including fluids with suspended solids, the seals are pressure balanced and made with a Teflon Bellows to maintain tight seal face contact up to 100 p.s.i. at 167° F or 75 p.s.i. at 212° F.

Find out, as Kolker did, what you gain by using Garlock CHEMISEAL Mechanical Seals. They are available in standard sizes from $\frac{1}{8}$ " to $2\frac{1}{8}$ " with a maximum length of $2\frac{1}{8}$ ". For more details, call your local Garlock representative at the nearest of the 26 Garlock sales offices and warehouses throughout the U. S. and Canada. Or, write for Catalog AD-164, Garlock Inc., Palmyra, N. Y.

GARLOCK

Canadian Div.: Garlock of Canada Ltd.
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Order from the Garlock 2,000 . . . two thousand different styles of Packings, Gaskets, Seals, Molded and Extruded Rubber, Plastic Products.

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CHEMICAL BUSINESS

From page 26

sins. A third is glycerine technology.

Mobay Chemical and Dow Badische Chemical also illustrate how useful products are made readily available in the U. S. through such ventures. In addition, they show how rapidly such companies grow after being established in the U. S.

Plants Grow Rapidly In United States

Mobay Chemical Company jointly owned by Monsanto and Farbenfabriken Bayer, AG, of West Germany — went into commercial production of polyurethane chemicals at New Martinsville, West Virginia, in 1956. Since then the plant has been expanded four times to raise capacity from 8 to 40 million pounds per year.

About a year ago, Mobay began building a separate plant at the New Martinsville location for the manufacture of polycarbonate plastic resins. Mobay was the first American company to produce polycarbonate resins in commercial quantities, with its plant going on stream in June 1960.

Dow Badische Chemical Company is a partnership venture of Dow and BASF Overze N.V., a subsidiary of Badische Anilin-und Soda Fabrik A.G., of Ludwigshafen, West Germany. A plant for producing acrylic acid and acrylates by a Badische-developed process went on stream in January 1960.

A second Badische process will be used in a butanol plant which will go on stream in the near future. A third Badische process will be used for a caprolactam plant, with a capacity of 40 million pounds per year, which will go into production in late 1961.

Bowaters is an organization that, in spite of being a fairly recent entry on the American scene, is operating on a major scale. At the time it was built in 1954, the \$60-million Bowaters plant in Calhoun, Tennessee, represented the largest investment by British industry

To page 56

EXCLUSIVE SURVEY by

CHEMICAL
PROCESSING

... 1500 key individuals . . . 158 plants . . . 18 companies

The Chemical Company: College-Degree Cosmopolis

ChE degree helps, but there's plenty of room for good men with other educational backgrounds (or no higher-education degree at all) in key operating-management and technical slots

By DANA B. BERG, Executive editor

AS TO BE EXPECTED, men with chemical engineering or chemistry degrees fill many key positions in the chemical industry. But a surprising number of important slots on the organization charts of chemical companies are occupied by men with other degrees . . . or no formal degree at all.

This is indicated in a just-completed CHEMICAL PROCESSING survey of technical management and personnel. (Survey does not include individuals with primary responsibilities in such areas as sales, marketing, customer technical service, purchasing, finance, law, public relations

and advertising.)

Chemical operations of 18 major companies (see list on this page) were covered, representing 158 individual chemical plants and more than 1500 key employees. Overall, the survey shows 42% of these men having a chemical engineering degree, 15% chemistry, 16% other technical degrees, 2% non-technical degrees, and 25% no degree. (Research titles and functions are not included in the above.)

Thirty-three different college or university degrees were mentioned in the returns of the survey questionnaires.

Companies participating selected their own "key per-

sonnel" according to this definition . . . "Those having decision-making and, in most cases, supervisory responsibilities . . . key men upon whom top management depends for productive, efficient operation and coordination."

Results were reported in four classifications:

- Major executives at the corporate and division level, by title
 - Major executives at the plant level, by title
 - Other key men at the corporate and division level, by functional area
 - Other key men at the plant level, by functional area
- The bar charts (pages 30

and 31) cover these four areas separately and break them down into still narrower sub-classifications. Following are some explanatory comments about each of the four charts.

Major Corporate & Division Executives

From Chart 1, it's apparent that a technical degree be-

Survey Participants

American Cyanamid Company
Armour Industrial Chemical Company
California Chemical Co.
(Oronite)
Food Machinery and Chemical Corporation
B. F. Goodrich Chemical Company
W. R. Grace & Co.
Hooker Chemical Corporation
Interchemical Corporation
Koppers Company, Inc.
Monsanto Chemical Company
National Distillers and Chemical Corporation
(U. S. Industrial Chemicals)
National Starch and Chemical Corporation
Pittsburgh Plate Glass Company
(Chemical Division)
Stauffer Chemical Company
Thiokol Chemical Corporation
Union Carbide Corporation
Witco Chemical Company, Inc.
Wyandotte Chemicals Corporation

Here's The Overall Picture

College or University Degree Earned	Corporate & Division Level		Plant Level		Total Corporate, Division & Plant Levels	
	Number	Percent	Number	Percent	Number	Percent
Chemical Engineering	225	54	417	37	642	42
Chemistry	47	11	187	17	234	15
Other Technical Degrees	90	22	153	14	243	16
Non-technical Degrees	17	4	10	1	27	2
No Degree	36	9	344	31	380	25
Total	415	100	1111	100	1526	100

College-degree Cosmopolis *From preceding page*

comes more necessary in the more "technically specialized" positions. Conversely, other skills and educational backgrounds become more important at the top-management levels.

The 16 non-technical degrees earned by men in the two top title groupings break down this way: liberal arts — 4; business administration — 4; engineering administration — 3; economics — 2; and one each of industrial relations, money and banking, and law.

Note the heavy emphasis on chemistry degrees in all title groupings except the directors of engineering group. Also note the surprisingly small percentage (24.4%) of chemical engineers in the general manager group vs. the relatively high percentage (29.7%) of chemists in this group.

Mechanical engineers are, logically, well represented under "other technical degrees" in the directors of engineering

group. Nine ME's are included here, along with one electrical engineer and one petroleum engineer — giving a total of eleven.

ME's do well in the managers of operations group, too. There are five of them, plus one each of electrical and civil engineers and one man with a metallurgy degree, among the eight individuals under "other technical degrees."

"Other technical degrees" for the technical director group break down into one each of mechanical engineering, mining engineering, physics, science, and bacteriology.

Major Plant Executives

Moving over to Chart 2, covering major executives at the plant level, perhaps the most interesting observation is the relative lack of individuals with non-technical degrees throughout. These key executives, if they have a

degree at all, usually have a technical degree.

Chemists evidently perform well in top plant-management responsibilities, 17% of the works and plant managers and superintendents having earned this degree.

In this same grouping (works and plant managers and superintendents), the mechanical engineer shows up strongly — 21 of them. Other degrees in the grouping include five each of industrial and civil engineering; two each of electrical, metallurgical and agricultural engineering, fuel technology, and physics; one each of petroleum, mining, fuel and general engineering, science, and bacteriology.

Works and plant engineers are lumped together with technical directors in the last bar of the chart. The former group contains 16 chemical engineers and two chemists as well as 12 mechanical, three civil, two electrical and one

industrial engineer. The latter group contains seven chemical engineers, two chemists and one man with a science degree.

Ten key men were reported under the titles of chemical control manager, chief chemist or lab supervisor. These are not included on the chart. Of the ten, four possess a degree in chemical engineering and six in chemistry.

Other Key Men at Corporate and Division Level

Chart 3, showing the breakdown for other key men at the corporate and division level, points up forcefully the need for a technical degree in these functional areas. The absence of non-technical degrees is even more apparent than on the graph for major plant executives; in fact, none of the 248 individuals reported has such a degree.

Note, too, the relatively high percentage of chemical engineers at this level. Conceivably, the men in these function groupings will be drawn upon to staff many of tomorrow's top-management positions. This could well mean that an even higher percentage of men with technical degrees, probably heavy on the ChE's, will be directing the destinies of chemical corporations.

Construction engineering has been included with plant maintenance and services functions on the last bar of this chart. The former group contains 10 chemical engineers plus seven mechanical, one civil and one architectural engineer. Latter group contains three chemical and one mechanical engineer.

Other Key Men in Plant

Two things become readily apparent when looking at Chart 4. First, the "no-degree" man plays a whopping role in running a chemical plant. Second, those key plant men that do have a degree all have some kind of technical degree.

In relation to the first point, let's emphasize again that these "no-degree" men re-

CHART 1 Degrees of Major Executives-Corporate & Division Level

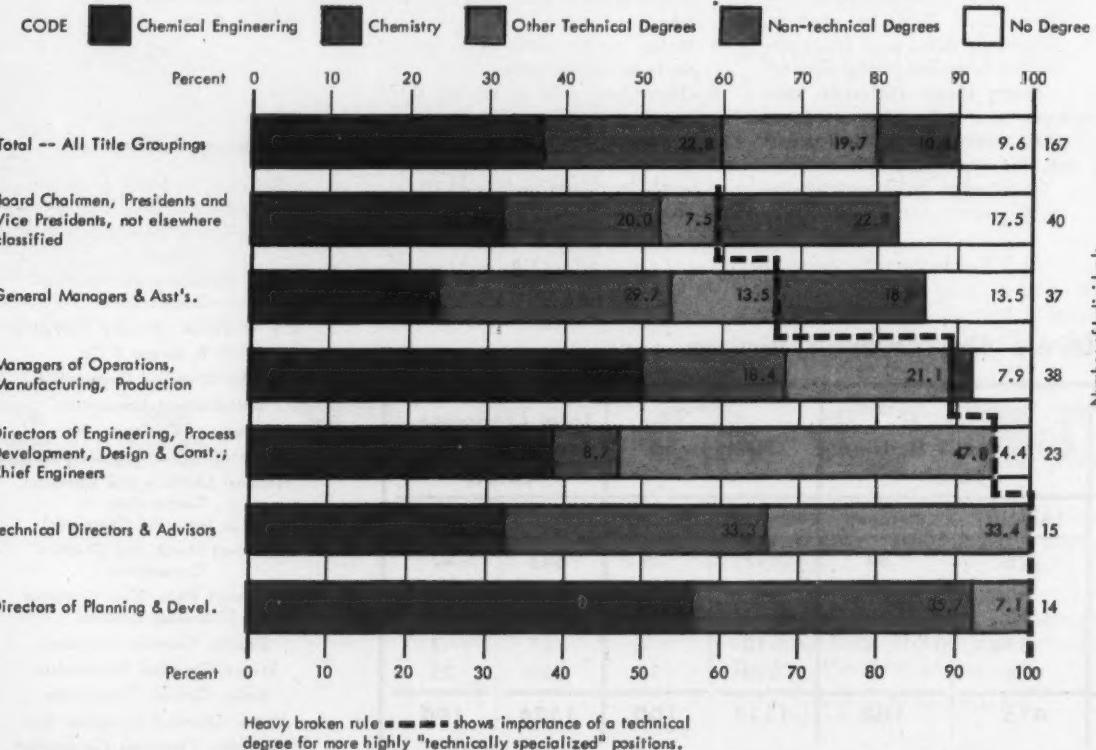
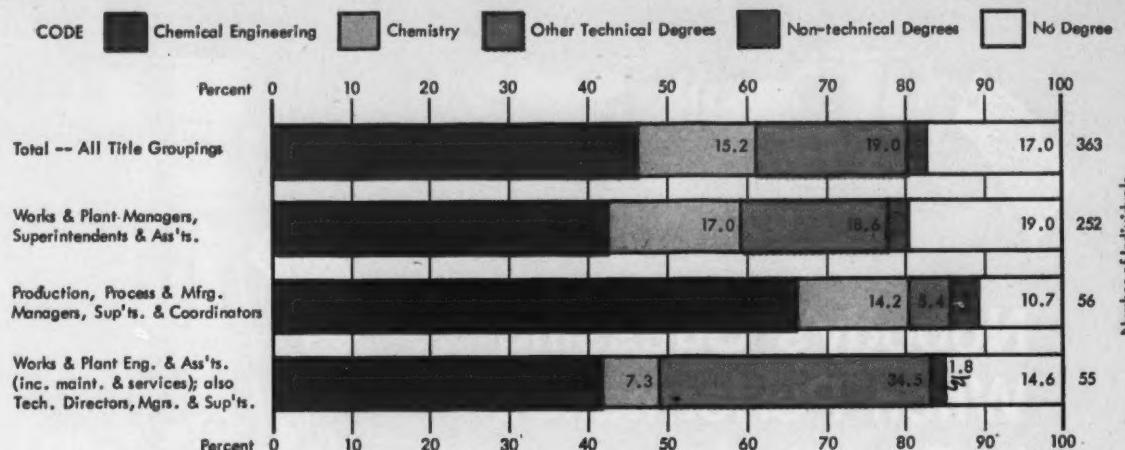


CHART 2 Degrees of Major Executives-Plant Level



ported here have been selected by management as being key men and have highly responsible positions. They include the general foremen and supervisors, shift foremen and supervisors, group leaders, etc., upon whose talents, knowledge and supervision the efficient functioning of a plant depends.

A look at the last bar of the chart will show that the chemical engineer has taken hold of process control concepts with vim. This evidently is anything but the restricted domain of the electrical engineer. Two EE's were reported in this grouping, plus (under "other technical degrees") two ME's, one industrial engineer and one man with a fuel technology degree. (Also note that there are fewer "no-degree" men in this grouping than in any other on the chart.)

It should be no surprise that ME's bulked large in the plant maintenance and services group. There are 24 such degrees here, as well as four EE's, two industrial engineers, and one each of civil, mining and marine engineering, and physics.

ME's are well represented in the process development and design and project engineering group, with a total of 20 (18 of them in project engineering). Six EE's are in this group (five in project engineering), and one civil engineer and one petroleum engineer. Within this grouping, 39 chemical engineers are in process development and design, 23 in project engineering.

How About Research?

While the survey did get reports on the area of research and development of new products, the data is not graphed. It is apparent that this is largely the domain of the man with a chemistry degree.

For example, of the 500 men reported in this group, 369 (74%) have chemistry degrees and 91 (18%) chemical engineering degrees. However, the chemical engineer catches up some when considering only

CHART 3 Degrees of Other Key Men-Corporate & Division Level

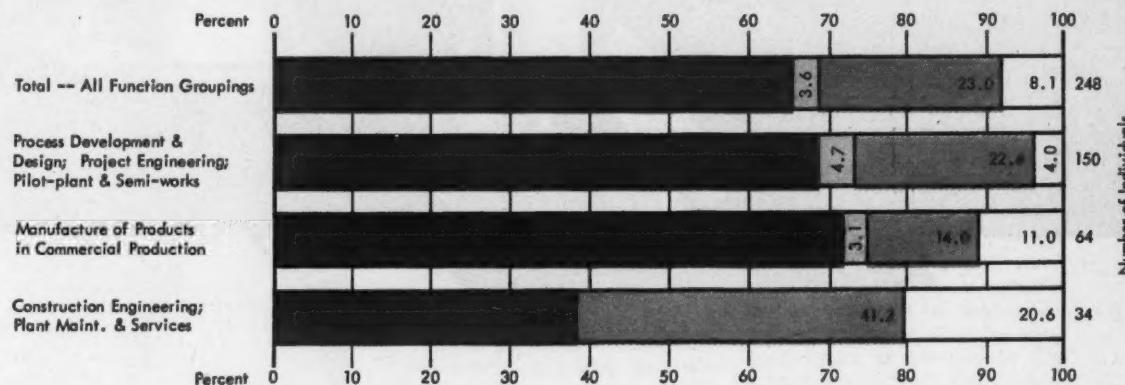
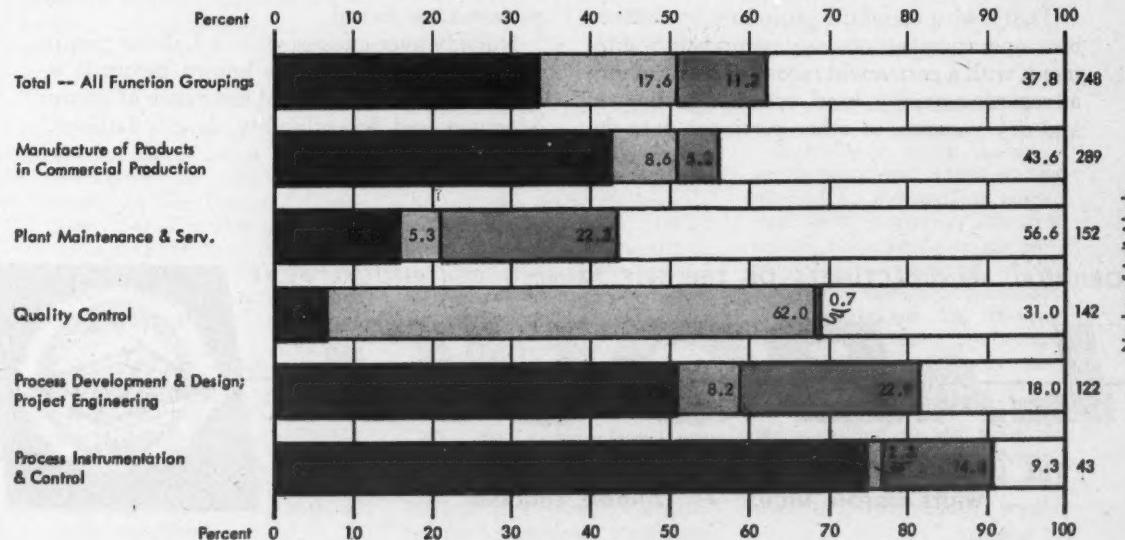


CHART 4 Degrees of Other Key Men-Plant Level





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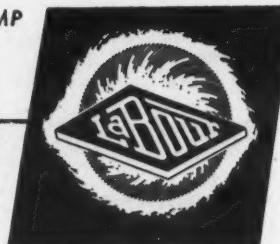
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the top corporate or division titles of research director or manager. Of these 76 total reported individuals, 25 (33%) have chemical engineering degrees and 48 (63%) have chemistry degrees.

It Takes All Kinds

It's clear that the chemical industry is highly cosmopolitan in relation to the educational backgrounds of its key men. This is true not only for the overall picture but also for a major share of definite titles or functional areas. In short, it "takes all kinds" to operate a chemical company or plant.

Chemical-industry employees who have educational backgrounds other than in chemical engineering or chemistry should take heart in this. The kind of degree (or even lack of a formal degree) is certainly not of over-riding concern to top management in staffing higher-echelon spots. Continuing self-education and development of management techniques will open many doors. ■

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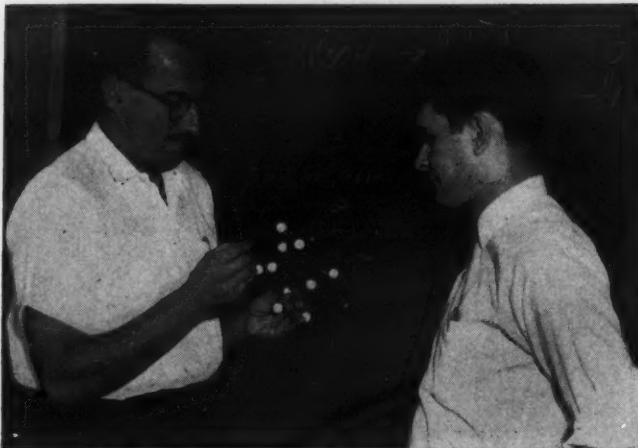
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Identifying creative researchers aim of personnel research

**Forced-choice method provides another means
for evaluating creative individuals in a laboratory
or among prospective new research employees**

By DR. WILLIAM D. BUEL, Staff Psychologist
The Pure Oil Company, Palatine, Illinois



(Photo courtesy Interchemical Corporation)

Creativity — that elusive group of attributes — is being sought by more scientific procedures

THE TREND toward increased R&D expenditures and the profit are forcing a closer examination of methods for selecting creative research personnel. Few companies doubt that there is room for improvement, particularly when viewed in the light of the rapid increase in research personnel in recent years. The overall efficiency of the research organization is necessarily related to individual creativity.

To more efficiently identify creative personnel, a forced-

choice rating scale (1) was developed in the research center of The Pure Oil Company. (2) The rating scale is made up entirely of statements pre-researched with regard to their ability to differentiate between various levels of creativity.

In order to check out the efficiency of the method, a second and third study were conducted in two unaffiliated research centers. (3, 4) Considerable differentiating ability was demonstrated in both of these situations.

How Rating Method Was Developed

The statements for this rating scale were collected by interviewing numerous research supervisors. Each supervisor volunteered what he felt were characteristics which distinguished his most creative subordinate from his least creative subordinate. The objectivity of the interviews was heightened by insuring anonymity to the supervisor and to those upon whom he reported.

From the large number of statements gathered in this fashion, 143 were chosen which appeared to be non-redundant with respect to the other statements in the group. All of the statements were then combined to form a rating scale which was used by 20 research supervisors to anonymously evaluate 74 research personnel.

Immediately thereafter, the director of research, the assistant director of research, and the assistant manager of the research center, independent of all other raters, ranked these 74 persons in regard to the *significance, originality* and *lastingness* of their research contributions. The average of these statistically treated scores served as each rater's criterion or creative performance score.

The data arising from both the supervisors' and directors' evaluation of each man was fed into an electronic computer for statistical treatment.

With the directors' average creativity scores serving as a criterion, correlations and average supervisors' ratings were calculated for each statement.

Subsequently, a forced-choice instrument was developed which consists of numerous groups of statements, four statements to a group, some statements highly favorable and others not so favorable. The rater is to rank the four statements in each group in relation to how well they describe the research worker he is evaluating. A total score is derived by scoring the rater's ranks in relation to the known statistical significance of each of the statements. This method, similar to other forced-choice methods, tends to reduce the conscious or unconscious tendency among some raters to color ratings in relation to factors extraneous to the job situation.

Test of the Method

In order to check the generalizability and value of the method, an independent cereal and feed company research center volunteered to participate in a follow-up study. Sixty-five research personnel were evaluated by 22 research supervisors. The method proved quite effective for identifying persons making *significant, original, and lasting* contributions to research as well as for classifying persons relevant to a point evaluation of "creativity," avail-

To page 57



By Ewing Galloway, N. Y.

Heidelberg University, the "cradle of science," has long been a major source of chemical innovation and continues today to exert major leadership in the West

U.S. Research In Europe —The Honeymoon Is Over

Advantages are still there and a promising new approach to working relationships is developing . . . but it's hard to get top personnel, unfamiliar problems in supervision are common, and the cost picture is not nearly as bright as originally painted

By JOHN MELLECKER, Editor-New York

AMERICAN INTEREST in European science is as old as our nation. Until World War I, our industry was heavily dependent on research done in Europe.

With cessation of World War II hostilities, immediate action was taken to find and employ European scientists, particularly those of displaced status, first in defense and later in industry. A booming American industry contrasted vividly with a devastated European continent, and so opportunities to immigrate loomed as all-desirable ventures to many fine scientists. Some have remained in the United States and have attained prominent and respected status.

"With the post-war development of the European economy, their technology, processes and products became increasingly important," recalls a Du Pont spokesman. Listening posts were established throughout Europe, with almost every major U.S. manufacturing company active or attentive to at least some degree.

Gradually, awareness developed that great advantages might ensue from research done in Europe, by European scientists, for U.S. manufacturing corporations. Aware of the highly creative attitudes of leading European scientists, our industry leaders expected and got fresh approaches to many research

problems. Doubtless, many favorable arrangements were made and much benefit has been derived by both parties.

Cost Breaks Pushed

Unfortunately, the element of European research being available at lower cost was given wide publicity. Many U.S. research leaders thus began to think that this was the principal motive for seeking research arrangements abroad. Figures were quoted to show variations by country, as if one could pick the place where his dollars could go further.

In many cases, these dollars were accumulating from business activities of the companies overseas, and were better spent there than returned in part to the U.S. So, what better way of spending them than to "pick Europe's scientific brains," as some stated it.

So a rush got under way to find and sign up the "best talent." An American Management Association symposium as recently as May 1959 dealt with the "how to" aspects of the theme: "Capitalizing on European Science." Clearly, a new, highly useful means for bringing the European and American continents closer together scientifically and industrially had been discovered.

Nearly two years have passed by since that Symposium. For more than a year, very little has

appeared in the U.S. business press on European research for U.S. business firms. What has happened? Is Europe still a happy hunting ground? Has our research appetite dulled?

From talks with responsible research and chemical industry leaders, it is evident that the answer to the latter two questions is "no."

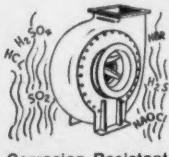
Awareness of the need for research, at least as far as the chemical industry is concerned, is at an all-time high, as are research budgets. The American chemical industry spent \$5 million for research abroad in 1958, out of a U.S. industry total of \$17 million, according to the National Science Foundation. Doubtless, their 1960 survey will indicate higher expenditures.

'All That Glitters . . .'

If the bloom appears faded from European research for U.S. firms, it is only because both the Europeans and the U.S. business people involved have begun to come to grips with the realities of getting really creative research done anywhere, particularly over long distances and with differences in language and social customs.

U.S. chemical industry top management people aren't saying much about this, for quotation. But privately they confide that

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U.S. Research In Europe

From preceding page

hoped-for productivity from Europe's highly creative minds has been somewhat disappointing, and costs — when everything is added in — have been a bit dismaying.

Yet, there seems little intention of giving up the venture. A composite of recently heard views goes something like this: "We've had to change our thinking from striking while the opportunity was 'hot,' to realizing that we're really in this situation for the long haul. Then, too, some of us are becoming increasingly aware that we haven't been set up too well in this country to effectively translate basic research results into practical products or processes. So, before we can expect to be able to do this from European research — with so much of it basic — we have some re-shaping to do back at home."

"Research personnel can be had, but should be expected to come slowly," cautions D. L. Benedict of Stanford Research Institute. "Social custom discourages frequent migration of professionals. Experienced prospective employees of high caliber are settled and usually satisfied with their positions. Considerable value is placed upon affiliation with a well-established national organization. Newcomers are viewed with some hesitancy. Similar disadvantages can be anticipated in dealing with the highly sought new graduates."

Even in mid-1959, IT&T's E. H. Leavey said (1): "Any company trying to establish new research facilities abroad . . . would have a tough time because of the shortage of scientists and technicians overseas as well as here." IBM spent (2) "over a year and a half assembling the first group



Photo from European

Strong individualism is a characteristic of the European scientist. This group is at one of the famed Max Planck Institutes in Germany

In general, insight seems to be developing in two principal areas: What to expect of the Europeans, and how to supervise and integrate operations from the U.S. It is disconcerting that as we seem to get to better understand the Europeans, their situation is changing so rapidly as to affect their attitudes as their industry grows in its ability to use more than the number of scientists and engineers available and national pressures develop affecting their migration interests.

of approximately 20 professionals."

A picture of European scientific and technological needs strikingly similar to our own can be had from a study report entitled (3): "Increasing the Effectiveness of Western Science," recently issued by a NATO group under partial support from Ford Foundation, and based on the efforts of such U.S. notables as I. L. Rabi of Columbia and Edgar L. Piret, U.S. Science Attaché at our Paris Embassy.

Recommendations in this

report include the generation of more scientists and technologists; more top-level teaching posts for more teachers; greater travel budgets for scientists, with fewer visa and employment restrictions; and lifting of customs delays on shipment of scientific apparatus.

Guidance Poses Problems

Has the growing shortage of scientists in Europe affected working habits and increased problems of supervision? Many U.S. research executives think so. "It's been surprising how the European scientific workers have adopted American attitudes towards use of leisure time, and working only the required number of hours," laments one administrator just back from Europe.

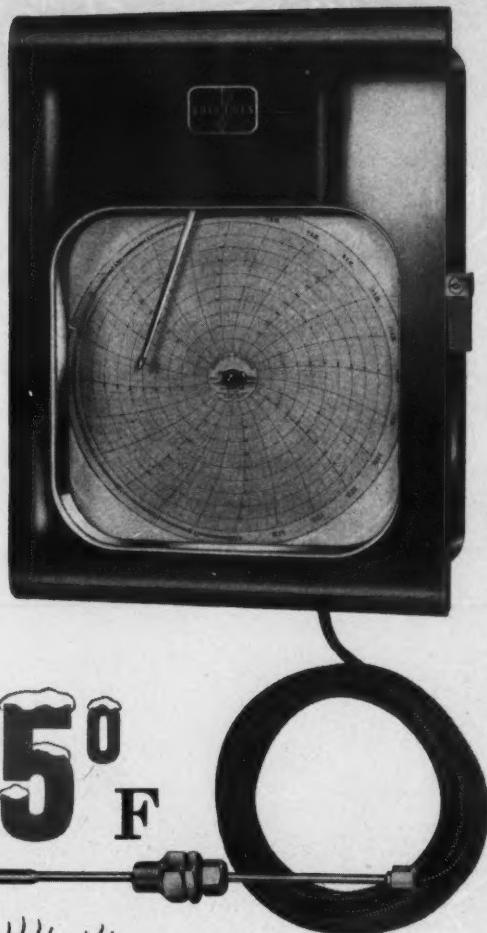
"A great deal depends on the drive and dedication of individuals," comments another. "Top-flight scientists are people of tremendous energy and dedication in any country. They deliver the results wherever they are. The trouble is, it's gotten so difficult to line up any more of these people, as they're already committed."

Perhaps the greatest problem for the American company dealing with European researchers — individually or in groups — is guidance. "When we have set up a lab, it's been with one of our own experienced research executives in charge for the running-in period," reports W. R. Grace Overseas Chemical's Robert Coquillette. "After he has been able to establish routine operation and the open-mindedness of expression characteristic of American researchers, he then endeavors to turn the administration over to a European scientist."

One* of the principal U. S. contract research organizations represented in Europe, Arthur D. Little, Inc., endeavors

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*Others in research and information exchange operations include Battelle Memorial Institute, Stanford Research Institute, Armour Research Foundation, and Foster D. Snell, Inc.



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L-M-W Polyethylene market tops 40 million lb/yr

Low-molecular-weight resins take hold in past five years as modifiers for synthetic and natural waxes and as wax replacements in paper coatings, polishes and textile softeners

By M. O. BRUNSON

Senior Chemist
Chemicals Division
Eastman Chemical Products, Inc.

THE BURGEONING VOLUME and success of low-molecular-weight polyethylenes is due partly to their ability to be used as wax replacements. But it's also partly due to unique characteristics that offer opportunities to produce products never before possible. Market has grown to a volume in excess of 40 million lb/yr within the last five years.

In the true sense these are resins, but since their first major use was as wax replacements they are erroneously considered to be waxes by many.

L-M-W polyethylenes are available in this country in molecular weights from approximately 1000 to 12,000. Those having a weight greater than 12,000 are generally regarded as plastics. Differentiation between the two is based on the fact that the less-than-12,000 molecular weight can be handled as hot melts, whereas materials of higher molecular weight are handled on extrusion or injection molding equipment.

Polymers of low molecular weight are produced commercially by two methods.

1) Polymerization of ethylene under controlled conditions to the desired molecular weight.

2) Controlled thermal degradation of high-molecular-weight polyethylene.

Physical characteristics of the low-molecular-weight polyethylenes are dependent mainly on molecular weight and density. In very general terms, molecular weight controls melt viscosity while density controls hardness and melting point. For example, a material of 1000 molecular weight and density of 0.90 may be a very soft, grease-like material at room temperature, whereas a material of 1000 molecular weight and a density of 0.95 would be a hard material with a melting point of 100°C.

There are exceptions where molecular weight would affect melting point; however, for molecular weights above 2000, if the density remains constant, very little difference is noted in the melting point as the molecular weight increases to 12,000.

To next page

Strong heat seals at low temperatures and pressures with short dwell times are possible with low-molecular-weight polyethylene coatings

TABLE 1 Properties of L-M-W Epolene* Polyethylenes

	Nonemulsifiable				Emulsifiable		
	N-11	N-10	C-10	N-12	E-11	E-10	E-12
Molecular Weight (approx. number average)	1500	2500	7000	1500	1500	2500	1500
Density	0.925	0.928	0.907	0.938	0.938	0.938	0.956
Ring-&Ball Softening Point (ASTM D-38-26), °C	103.4	105.6	100-111	12-14	103.5	105.9	107-11
Penetration Hardness, tenths of mm., 100g/5 sec/77°F	3	1	7	.5	5	2	1
Acid Number	Nil	Nil	Nil	Nil	12-16	9-12	12-16
Saponification Number	Nil	Nil	Nil	Nil	25-30	24-25	25-30
Color (liquid), Gardner scale, max.	2	2	2	2	2	2	2
Flash Point, °F	600	600	600	600	600	600	600
Fire Point, °F	600	600	600	600	600	600	600
Melt Viscosity, cps							
120°C (248°F)	360	2500	16,000	340	400	1500	455
130°C (266°F)	285	1900	13,500	275	325	950	345
140°C (284°F)	225	1600	10,500	220	250	700	265
150°C (302°F)	180	1250	9300	180	200	500	205
160°C (320°F)	145	740	7300	160	170	380	160

*Registered trademark of Eastman Kodak Company for its polyethylene resin



L-M-W Polyethylene market

From preceding page

In addition to the simple polymers, partially oxidized grades of low-molecular-weight polyethylene are available. Partial oxidation of these materials allows them to be emulsified in aqueous solutions for a variety of uses.

Both oxidized and non-oxidized resins are available in a wide range of densities and molecular weights.

All of the materials listed in table 1 (page ??) have found use as wax replacements. In addition, Epolene C-10 has certain characteristics which class it as a plastic and it may be used as such.

Non-emulsifiable polymers are essentially non-toxic, chemically inert, unaffected by acid or alkali, and insoluble in all solvents at room temperature. They are completely soluble in aromatic and aliphatic hydrocarbons and chlorinated solvents at temperatures above 190°F. To a lesser extent they are soluble in hot esters, ketones and high-molecular-weight alcohols.

These materials exhibit excellent stability in the molten state, with little change in color or viscosity when held at temperatures up to 350°F for prolonged periods.

Emulsifiable(oxidized) low-molecular-weight resins are equally non-toxic and insoluble at room temperature. At this temperature they are unaffected by acid or alkali, although they tend to show some discoloration when in prolonged contact with high concentrations of amine vapor. Solubility in hot solvents is similar to that of the non-oxidized material, with one exception — they are somewhat more soluble in polar solvents.

These polyethylenes have a wide range of compatibility with a variety of materials such as natural and synthetic waxes, hydrocarbon resins, polyterpene resins and partially hydrogenated rosins.

Estimated consumption of waxes in 1955 was approximately 1.5 billion lb. Expand-



M. O. BRUNSON, a senior chemist in the Chemicals Division of Eastman Chemical Products, Inc., supervises the sales development and customer-service work of the Polyolefins Group. He received his BS in chemistry from Clemson College in 1950. After teaching chemistry for one year at Clemson, he came to Eastman in the spring of 1951 as a chemist in the Development Group, Polyolefins Section, and worked extensively on research and development of low-molecular-weight polyethylenes. In 1958, Mr. Brunson was appointed to his present position to direct the operation of the Polyolefins Group.

ing uses for waxes since that time show that the consumption for 1960 will probably be close to 2 billion lb or about 10 lb per capita.

Use as Wax Replacements

Petroleum waxes make up the bulk of this volume but, in an increasingly large number of applications, low-molecular-weight polyethylene is being used to enhance the properties of these waxes. The resins are also being used to modify other natural and synthetic waxes and in some cases have completely replaced waxes that were in common use prior to 1950.

Increasing use of synthetic floor coverings within the past 20 years has created the need for polishes free of solvents that might attack these coverings. Aqueous polyethylene emulsions eliminate this solvent problem and also produce compositions that provide a high gloss without buffing.

Paper Coatings

Natural waxes, for many years, have been used in the coating of various types of paper to provide a barrier against transmission of water vapor. In addition, other benefits gained were waterproofness, resistance to greasy materials and added eye appeal.

L-M-W resins have been used to enhance the properties of wax coatings (see Table 2). In some applications a

concentration of polyethylene as low as 0.5% showed a marked improvement, while in others as much as 50% was required to achieve desired results.

Use of Plastic Properties

Most low-density polyethylene resins with a molecular weight of 5000 to 12,000 show some of the plastic properties normally associated with polymers of a very high molecular weight. A resin with a density of 0.907 and a molecular weight of 7000 falls into this category.

Paper coated with this resin finds use as a substitute for paper coated with extrusion type polyethylene. Although Epolene C-10 coatings do not show the same resistance to creasing as do those based on the high-molecular-weight

polymers, their resistance gives adequate moisture-vapor and grease resistance in certain types of applications.

Crease resistance of such coatings can be substantially improved by modification with certain hydrocarbon and polyterpene resins. Generally, such modifications greatly improve the barrier properties of Epolene C-10 and at the same time reduce the coating cost per pound.

Principal advantage gained through the use of Epolene C-10 in coating paper is its ability to be applied as a hot melt.

Hot-melt applications are generally less expensive than extrusion laminations on short runs and, therefore, are especially suited to small-scale operations and runs which would not be economically feasible by other methods.

Epolene C-10 hot-melt applications may be applied by several coating principles. Most popular method is roll coating. This involves heating the polymer or blend to a fluid state, after which it is applied to the substrate, smoothed and then chilled to produce a high gloss. Coating temperature is usually in the range of 300-375°F, which produces a viscosity of 3000 to 9000 cp, depending on temperature and composition.

A number of roll-coating methods are normally used to apply the hot melt coatings.

TABLE 2 Improved properties resulting from use of polyethylene in wax formulations

Application	Percent Polyethylene	Improved Properties
Milk Cartons	1/2 to 2	Gloss; resistance to thermal shock, flaking, leakage and bulge
Bread Wrap	2 to 10	Moisture vapor transmission (MVTR), increased blocking temperature
Freezer Paper	5 to 50	Gloss, MVTR, grease resistance
Folding Cartons	2 to 20	Gloss, grease resistance, scuff resistance, increased blocking temperature
Corrugated Board	5 to 50	Water resistance, scuff resistance

These include the:

- 1) Single-roll kiss-coater with equalizer rod
- 2) Two-roll coater for coating on one or two sides
- 3) Two-roll kiss-coater with equalizer rod
- 4) Three-roll reverse coater with equalizer rod
- 5) Pressure-curtain coater

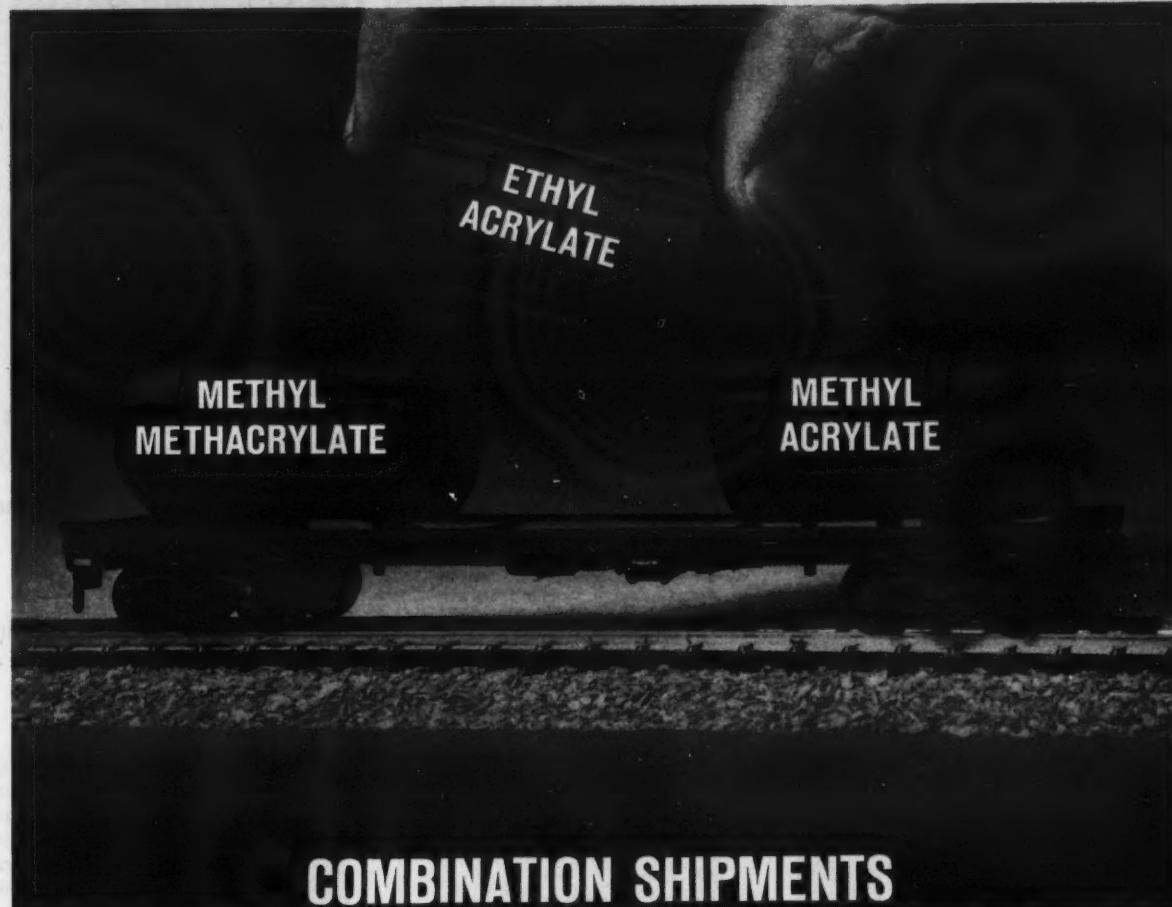
L-M-W Polyethylene As Textile Softeners

Increasing use of crease-resistant finishing resins for cotton fabrics has created both desirable and undesirable characteristics. On the plus side is the obvious improvement of crease resistance. On the negative side, tensile strength, abrasion resistance, hand and sew-ability are adversely affected. To offset the undesirable features, softeners have been employed.

Prior to the development of polyethylene softeners, the materials used to provide softening had the disadvantage of discoloring the fabric, producing undesirable odor, and being chlorine retentive. Softeners produced from low-molecular-weight oxidized polyethylene eliminate the objections found in most of the previously used softeners. However, polyethylene softeners for this application must be prepared in suitable emulsions.

Other uses for low-molecular-weight polyethylene are in the manufacture of candles, crayons and carbon paper. Rubber-compounding applications permit its use as a calender-release agent in the milling operation of the green rubber, and as a mold-release agent in the curing stage. In the manufacture of printing inks, Epolene N-11 and Epolene N-10 find extensive use as slip agents in oil-base printing inks.

(Low-molecular-weight polyethylenes are products of Eastman Chemical Products, Inc., Subsidiary of Eastman Kodak Company, 260 Madison Avenue, New York 16, N. Y.)
Check 2402 opposite last page.



COMBINATION SHIPMENTS REDUCE COST OF ACRYLIC MONOMERS

Here's how to get less-than-tankcar, or less-than-truckload drum quantities of acrylate and methacrylate monomers at tankcar or carload prices.

1. Plan your purchases so that the total quantity of monomers or auxiliaries adds up to a full car or truck weight.
2. Buy from a source able to make combination shipments of all the different acrylic monomers you need. Rohm & Haas manufactures both acrylate and methacrylate esters, a complete range.

It is part of your Rohm & Haas technical representative's job to help you calculate the most economical way to purchase Rohm & Haas acrylic monomers. By analyzing carrier rates and providing detailed delivered cost data on various

combination purchases, both bulk and drum, Rohm & Haas can help you plan lowest cost purchasing. Rohm & Haas not only offers a complete range of acrylic monomers, but is ready to assist in planning facilities for storing and handling these monomers.

Write Dept. SP-7 for technical literature on any of the monomers listed below. Samples also available.



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Methyl Acrylate • Ethyl Acrylate • Butyl Acrylate • 2-Ethylhexyl Acrylate • Methyl Methacrylate
Ethyl Methacrylate • Butyl Methacrylate • Hexyl Methacrylate • Decyl-octyl Methacrylate
Lauryl Methacrylate • Stearyl Methacrylate • Glacial Acrylic Acid • Glacial Methacrylic Acid.

Check 2403 opposite last page.

Which of these 3 products and services can you get from BECCO?



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We got 'em—
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They're FREE!

Years of experience in working with Hydrogen Peroxide have produced a wealth of information on this valuable compound, its properties, and reactions. Much of this information is available virtually exclusively from Becco. We've compiled a number of Technical Bulletins, which are yours free on request. Simply decide which ones you want, and mail the coupon below.

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- No. 41—Becco H₂O₂ 35% HP (high purity)
- No. 42—Becco H₂O₂ 35% Formula D (for preparing dilute solutions)
- No. 46—Concentrated H₂O₂ (over 50% concentration)
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By "other", we mean "Other than Hydrogen Peroxide". Lots of otherwise knowing people labor under the impression that Becco makes only H₂O₂. Actually, there are quite a few "other" useful peroxides in Becco's catalog, some of which are especially suited to high-temperature oxidation reactions.

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CHEMICAL MATERIALS

You can make 'paper' from 100% synthetic multi-cell fiber

It does not require working, fillers or bonding agents

Uses: Material can be used to produce wet-formed non-woven fabrics and papers of 100% man-made fibers. Potential end uses include wall covering, decorative papers, filters, molding articles using a web- or felt-like structure or synthetic leather-like articles.

Features: Multicellular rayon fiber can be used to manufacture "paper" without the necessity of working the fiber, adding pulps, fillers or bonding agents other than water to form a slurry.

Description: Rayon fiber, RD-101, is a short, multicell material. When formed into a wet-laid web and dried, these non-thermoplastic, multicellular, cellulosic fibers firmly bond themselves and lock into place. A wide range of textures and physical properties can be produced.

(RD-101 rayon fiber is a product of American Viscose Corporation, Industrial Merchandising & Product Development Dept. 350, Fifth Ave., New York 1, N. Y.)

Check 2405 opposite last page.

Large pore size feature of catalyst carrier

Ceramic, large-pore catalyst carrier has been developed. Medium is available in a variety of sizes having pores ten times as large as those available in conventional catalyst carriers.

Large pores permit gases or liquids to enter and diffuse within the structure, providing optimum control of the reaction. Macroport A catalyst carriers are currently available as spheres, pellets and granules of fused Al_2O_3 .

(Macroport A catalyst carrier is a product of Refractories Division, Norton Company, Worcester 6, Mass.)

Check 2406 opposite last page.

HOW HERCULES HELPS...

SOLVE CONCRETE PROBLEMS

Construction men are quickly acknowledging the fact that concrete treating compounds based on Parlon® chlorinated rubber provide these advantages. They reduce construction costs because they allow the cured concrete to be painted, bonded, or directly tiled over without the necessity of removing the treating compound. These products also eliminate the use of burlap, plastic sheeting, and other coverings that were previously needed to prevent evaporation and allow the fresh concrete to cure properly. Whether the concrete construction is bridges, building construction, landing strips, or highways, you will have better performance where compounds based on Parlon chlorinated rubber are used.



YOU CLEAN AND DISINFECT more quickly and easily. Pine oil cleaners are known to be universal in their ability to clean and deodorize. When used in sufficient quantity, pine oil becomes an efficient disinfectant as well as a cleaning agent. Today, many manufacturers of these cleaners rely on this wonder working ingredient, Yarmor® pine oil, to make their products more reliable and widely acceptable not only in the home, but also in industry.



661-1

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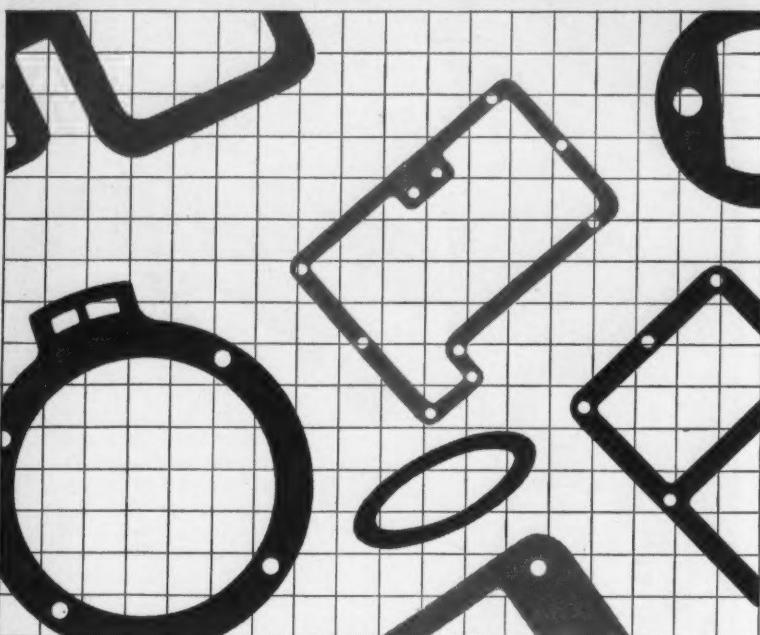
CHEMICAL MATERIALS FOR INDUSTRY

HERCULES

Check 2407 opposite last page.

R/M CAPABILITY DOES IT AGAIN!

Develops these outstanding gasket materials



FLUOROBESTOS for LOX and cryogenic service

- A-56 for flange temperatures to 1100° F
- RL-638 for extreme heat, flame penetration resistance

R/M FLUOROBESTOS* is a high grade, long-fiber asbestos unwoven sheet thoroughly impregnated with Teflon.† It has the same sealing and physical characteristics as compressed asbestos sheet, with the added benefits of Teflon. Deformation under load at 500°F (2000 psi) is only 0.1%.

R/M No. A-56 is a compressed asbestos sheet made from spinning-grade long asbestos fiber and a nonreverting compound binder. Average tensile strength of 8000 psi. The only compressed asbestos sheet made commercially in thickness of .008 in. $\pm .001$ in. It has high heat resistance—is withstanding flange temperatures of 900 to 1100°F where internal temperatures are as high as 1400°F.

R/M No. RL-638 is a wire-inserted, woven asbestos fabric coated with neoprene compound and aluminum finish. It is ideal for use as seals against extreme heat and where high-temperature (2000°F) flame penetration resistance is required. Its light weight is a plus value. Meets FAA Specification CAR-04b-075 (a) for Fireproof Materials FAA Release #259, Section 1, Part B1.

*Registered trademark for R/M reinforced asbestos Teflon sheet.

†Registered trademark for Du Pont fluorocarbon resins.

Write for our Mechanical Packing and Gasket Materials Catalog P-100. And remember, when ordering gaskets from your cutter specify R/M materials. Sheets are available from your authorized R/M distributor.

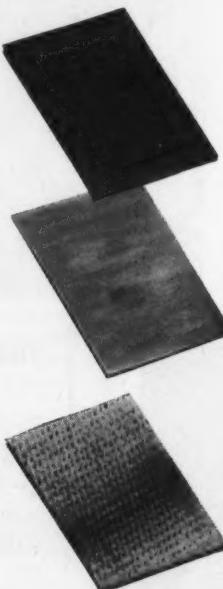
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MECHANICAL PACKINGS AND GASKET MATERIALS

Check 2408 opposite last page.

CHEMICAL MATERIALS

Thermoplastic resin boasts zero moisture absorption

Fluorohalocarbon molding and extrusion compounds find extensive use where good electrical and corrosion- and moisture-resistant properties are needed



DEVELOPMENT of fluorohalocarbon* molding and extrusion compounds opens a broad use pattern for packaging and component applications. These thermoplastic resins have high chemical and temperature resistance. Other explored applications include: electric-cable jacketing, anti-septic medical equipment, chemical gasketing, and electrical components where low moisture absorption is needed.

Approved by the Food and Drug Administration, these Halon resins are the result of several years of product development work which also produced the supplier's "Aclar" film.

Available in two types, VK and TVS are suitable for both molding and extrusion applications. The resins possess the usual thermal and chemical stability of the fluorocarbons. Compounds have built-in flexibility, radiation resistance, good moldability, weather resistance, easy cleanability, excellent machineability and are non-flammable.

Furthermore, the structure of the resins is such that crystallization is retarded during slow cooling cycles after exposure to elevated temperatures, thus tending to maintain toughness, flexibility and clarity.

Virtually unaffected by inorganic acids, alkalis and oxidizing agents, and many organic solvents, the materials possess excellent radiation and

*Fluorohalocarbon contains fluorine, chlorine carbon and other components not revealed by the manufacturer.

heat and cold resistance. They are serviceable up to 390°F, can be flexed in sections at -320°F, and provide transparency in sections up to $\frac{1}{8}$ " thickness.

Extrusion

These resins have been successfully extruded by the same type methods normally employed for extrusion of polyethylene. This includes the extrusion of rod, tubing, flat film, blown tubing film and wire coating. Use of the pellet form is recommended.

Standard extrusion equipment capable of producing temperatures up to 700°F at the die can be used. Electrical heating is recommended to obtain and accurately control at these high temperatures. Close temperature control is necessary to prevent overheating and degrading of the plastic, particularly at the die where temperature should be maintained within $\pm 2^{\circ}\text{F}$.

Surfaces in contact with hot plastic should be made of corrosion-resistant material such as chrome-plate Xaloy 306, Hastelloy or Type 303 stainless steel. Trace organic contaminants, including residual vinyls and polyethylene, degrade and discolor the resin at operating temperatures.

Injection Molding

Injection molding methods and equipment are the same as employed for other thermoplastics. Cylinder and mold temperature requirements are higher and injection pressures

**Electricals and Physicals
Merit Attention**

	Halon VK	Halon TVS
Dielectric Constant @ 77°F		
10 ² Cycles	2.8	2.6
10 ³ Cycles	2.4	2.4
Surface Resistivity, 77°F (ohm-cm)		
	>10 ¹⁶	>10 ¹⁶
Abrasion Resistance, gm/1000 Cycles (Taber CS-10 Wheel)		
	0.8 x 10 ⁻²	0.6 x 10 ⁻²
Tensile Strength (psi)		
70°F	4300	—
75°F	—	4970
212°F	1300	3300
280°F	240	250
Compressive Yield @ 77°F (psi)		
	4600	7400
Impact Strength Izod @ 77°F (ft lb/in notch)		
	27*	4.7

*Resin does not break cleanly

of 15,000 to 25,000 psi are common.

Surfaces in contact with hot resin should be made of the same corrosion-resistant materials recommended under extrusion molding. Trace organic contaminants, including residual resins such as vinyls, polyethylene and nylon, degrade and severely discolor Halon resins at operating temperatures. Pellet form of resin is recommended for this application.

Compression Molding

Both types of resins are thermoplastic, with good flow properties, and are well adapted to compression molding techniques.

Resins are supplied in both fine powder and pellet form. Powder is recommended for thinner-gage sheets. Due to low thermal conductivity of the plastic, sheet molding techniques vary slightly according to sheet thickness.

Potential Applications

Resins have good electrical properties at high and low temperatures. They have extremely high surface and volume resistivity, and by

ASTM tests show zero moisture absorption. Electrical applications include insulation for hook-up wire, printed-circuit boards, flexible cable and cable assemblies, and in the manufacture of coil forms, tube sockets, terminal insulators. The resins show promise as a lining material for vessels and pipe, and in manufacture of gaskets and O-rings — where the corrosion resistance is an advantage.

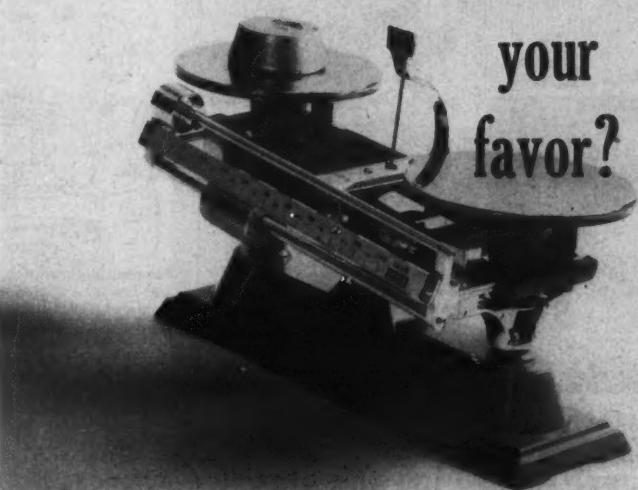
Inertness and toughness of the resins are such that, coupled with economies of injection molding, parts can be produced which in many cases provide the service of stainless steel parts at lower cost.

Corrosion resistance of the resins makes them suitable for the caps of containers handling such highly corrosive materials as fuming sulfuric and nitric acids.

The new resins are currently available in developmental quantities; commercial quantities should be available by the second quarter of 1961.

(Halon resins are available from the Plastics and Coal Chemicals Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N.Y.) Check 2409 opposite last page.

what
tips
the
balance
in
your
favor?



consider the odor factor...

For hundreds of industrial and consumer products, what tips the balance toward success can frequently be the proper odor. Yet the odor factor, so very important to sales, is often overlooked and misunderstood. Stop and think. Your product will have more customer appeal with a pleasant odor . . . or freedom from an objectionable one.

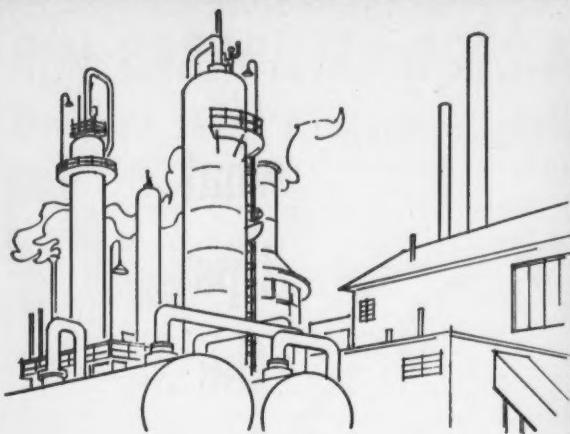
Odor is a factor in your new product. And no one understands its importance more than Sindar. So consult Sindar, specialists in odor for industry. Our vast resources and intimate understanding have helped hundreds of products find greater acceptance through the proper odor factor.

SINDAR REPORTER
FREE! Send for the Sindar Reporter . . . our house publication that discusses the odor factor in detail for industrial products and problems. It's filled with important technical and marketing information that could be vital to your manufacturing and selling program. Receive it regularly without obligation. Write today.

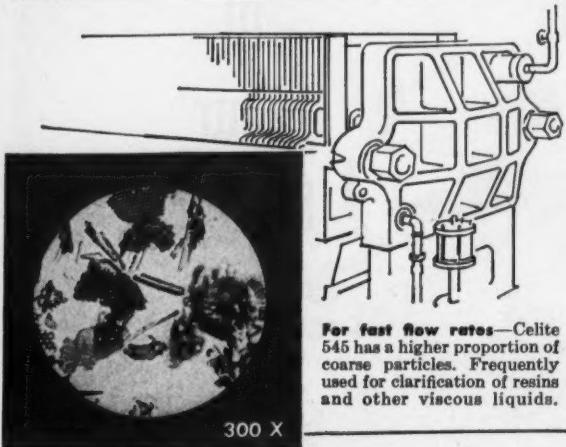
SINDAR Corporation
321 West 44th Street, New York City

Check 2410 opposite last page.

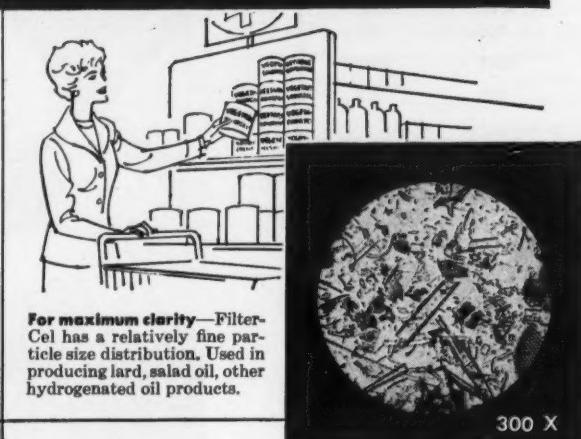




For flow rate plus clarity—Hyflo Super-Cel has the right combination of large and fine particles. Heavily used in chemical processes such as caustic soda production.



For fast flow rates—Celite 545 has a higher proportion of coarse particles. Frequently used for clarification of resins and other viscous liquids.



For maximum clarity—Filter-Cel has a relatively fine particle size distribution. Used in producing lard, salad oil, other hydrogenated oil products.

In diatomites, Johns-Manville precision processing works for you

Celite has the exact grade for every filtration need from fast flow rate to maximum clarity

Study samples of various filtration grades of Celite* diatomite with the unaided eye. Rub them between your fingers. One grade looks, feels very much like another.

Then compare these grades under the microscope. Each has its own distinctive particle size distribution. Each is precision-milled to fill the most exacting filtration requirements, ranging all the way from maximum flow rate to maximum clarity.

Celite 545, for example, with a higher proportion of large to fine particles, is used to remove large suspended impurities at maximum flow rates. Hyflo Super-Cel® has a balanced particle size distribution, combines good liquid clarity and moderate flow rate. But Filter-Cel® has a much higher ratio of small particles, is tailored for use where high clarity outweighs flow rate.

Whatever your filtration problem—Johns-Manville can furnish the "right"

grade for the job. You have a choice of 9 intermediate grades *plus* many special grades. Each comes from the largest and purest commercially available deposit. Each is processed and graded at the same plant under the same uniform conditions.

For information on specific filtration or mineral filler problems, talk to your nearby Celite engineer, or write to us. Johns-Manville, Box 14, N. Y. 16, N. Y. In Canada, Port Credit, Ont.

*Celite is Johns-Manville's registered trademark for its diatomaceous silica products.

JOHNS-MANVILLE



Check 2411 opposite last page.

Surface active agents offer versatility in compounding

Syrupy polyphosphate esters are readily soluble

Uses: Of the four members of series, two show good wetting properties in hard and soft water, and excellent wetting in 5% to 10% caustic soda solutions and sulfuric acid solutions. The remaining two are more interesting as alkali-stable detergents and as emulsifiers and stabilizers for latexes and for polymerization.

Features: Products offer maximum versatility in compounding since they can be neutralized with any desired alkali or amine, and be diluted with water or with solvents. They exhibit remarkable wetting, emulsifying and detergent properties particularly in acid and alkaline media. They have definite anti-corrosive and metal ion sequestering properties.

Description: Polyphosphate ester concentrates are supplied in the form of readily soluble syrupy acidic esters at 98-100% activity. They form clear to translucent solutions in water, dilute acids and dilute alkalies. Color is light to medium straw or amber and they have a mild odor.

(Phosphonol surface active agents are products of the Beacon Chemical Industries, Inc., 33 Richdale Ave., Cambridge 40, Mass.)

Check 2412 opposite last page.

Monofilament fiber of Teflon FEP available

Availability of experimental quantities of Teflon FEP-fluorocarbon monofilament fiber has been announced. Previously, only multi-filament yarns of Teflon TFE-fluorocarbon fiber have been on the market.

Experimental price for the fiber will be \$35/lb. It is available in two sizes; 250 denier equivalent to a cross-section diameter of five mils; and 1200 denier equivalent to

CHEMICAL MATERIALS

a cross-section diameter of 11 mils.

Monofilament is believed to be potentially useful in such fields as chemical distillation and gas de-misting where wires of precious metals now are required. In vacuum filters, the non-sticking characteristic of Teflon would make cleaning quick and easy.

(Teflon TFE-fluorocarbon monofilament fiber is a product of Textile Fibers Department, E. I. Du Pont de Nemours & Company, Wilmington, Del.)

Check 2413 opposite last page.

Polyether foaming system in two-package form now available

Uses: System is designed primarily for refrigeration applications as an insulating material.

Features: System produces foam with a lower "K" factor than any other type of insulating material, according to the manufacturer. Foam has high strength, low water vapor transmission and excellent dimensional stability.

Description: Known as Selectrofoam 6504 and 6505, the system contains all necessary chemical additives, including a fluorocarbon blowing agent, and eliminates need of any additional formulating before using. It is based upon the company's standard line of Selectrofoam polyether polyols for rigid uses. Density of foam is 1.6 lb/cu ft for open expansion or 2.3 lb/cu ft for molded foam.

(Selectrofoam 6504-6505 foaming system is a product of Paint Division, Commercial Development Department, Pittsburgh Plate Glass Company, One Gateway Center, Pittsburgh 22, Pa.)

Check 2414 opposite last page.

For more information on developments in this section, check the Reader Service Slip.

NEW *Nalprep**: KEY TO EFFECTIVE PRETREATMENT OF COOLING WATER SYSTEMS

Triple-Action Treatment for Complete Preparation At Critical Points in Cooling System Life

Your experience can tell you at once that a newly-fabricated cooling system is never completely clean and free of oils, dirt, corrosion, and other contaminants . . . And that specifications calling for equipment "free of corrosion or corrosion products and thoroughly cleaned" are closer to wishful thinking than practical engineering. You know that a clean, fully-protected system will have fewer maintenance problems under the typically fluctuating conditions in a new system . . . but also that cleaning after the equipment has been in service destroys the protective film and exposes metal surfaces to rapid corrosion.

Now, with *Nalprep*—and only with *Nalprep*—cooling systems can be continuously, effectively, and economically protected from corrosion from the very start.

Nalprep performs three vital jobs at two critical times in the life of a cooling system. The times are: when the system is new; and immediately after cleaning. The jobs are: (1) removing organic and inorganic materials and deposits from metal surfaces, (2) preventing the clean, activated metal from reacting with anything but filming inhibitor, and (3) at the same time providing the initial protective film of corrosion inhibitor over the entire metal surface.

The Inside Story



No pretreatment Degreasing only With *Nalprep* treatment

Three identical mild steel exchanger tubes shown above received the same filming corrosion inhibitor dosages for one week. Tube at left shows rapid corrosion development when no pretreatment was given. Center tube was degreased only; shows beginnings of pitting and tuberculation. Tube at right received *Nalprep* treatment. Protective film is complete; corrosion non-existent.

Time lapses, varying from a few hours to days or even weeks, usually occur between the basic steps of construction, cleaning, testing and starting up cooling systems. These intervals expose metal surfaces to corrosion, so that when initial high-level filming inhibitor treatment is used at startup, without pretreatment, there are already corrosion sites in the system: areas which will not permit film formation to occur, regardless of the effectiveness or concentration of the inhibitor. This is why many properly-treated systems show disappointing, damaging corrosion-in-progress early in life.

How *Nalprep* Works

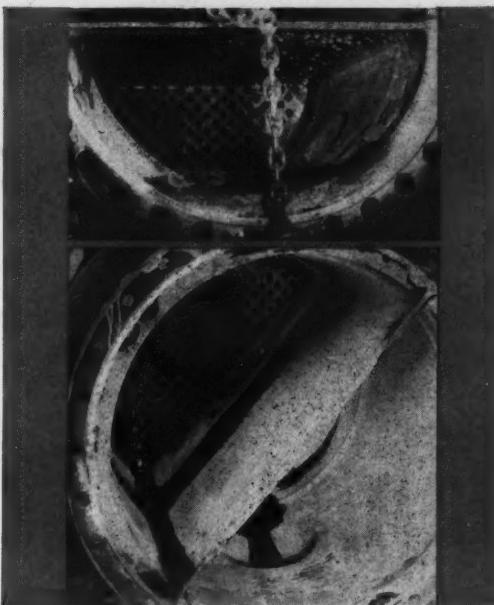
Nalprep was developed to clean metal thoroughly, then protect it with corrosion inhibitor before it can react with anything else to begin forming corrosion sites. After initial *Nalprep* filming, and subsequent adequate maintenance dosages of inhibitor, corrosion need never be a problem again.

Fed to a new system in water—which ideally can be the water used for hydrotesting—*Nalprep* does a

quick, complete job of cleaning and putting the initial film on all metal surfaces. Or *Nalprep* may be used to treat individual parts of a system, or to protect new equipment being added to an old system. After acid cleaning or mechanical cleaning, *Nalprep* can also be used for fast re-establishment of a tightly-adherent protective film.

It should be emphasized that high-level treatment alone is not a satisfactory substitute for *Nalprep* pretreatment.

Nalprep on the Job



Two new heat exchangers in the same cooling system are shown here after hydrotesting. New exchanger at top was not pretreated. Corrosion gained considerable headway during hydrotesting, as evidenced by the severe tuberculation visible on the baffle plate. Exchanger at bottom received *Nalprep* pretreatment. Note completely filmed baffle, tubes and sheet; absence of any corrosion residue.

Nalprep effectiveness, as illustrated above, leaves no doubt about the basic economy of including the *Nalprep* step in both new and cleaned cooling systems. Pretreatment, while adding little to overall time and cost, adds a great deal to subsequent savings in corrosion prevention, downtime and maintenance charges. Ask your Nalco Representative for details on *Nalprep*.

Nalco Technical Data Kit C4 tells the story of *Nalprep* development and results. Your copy free on request to Nalco.

*NALPREP is a Nalco Chemical Company trademark.

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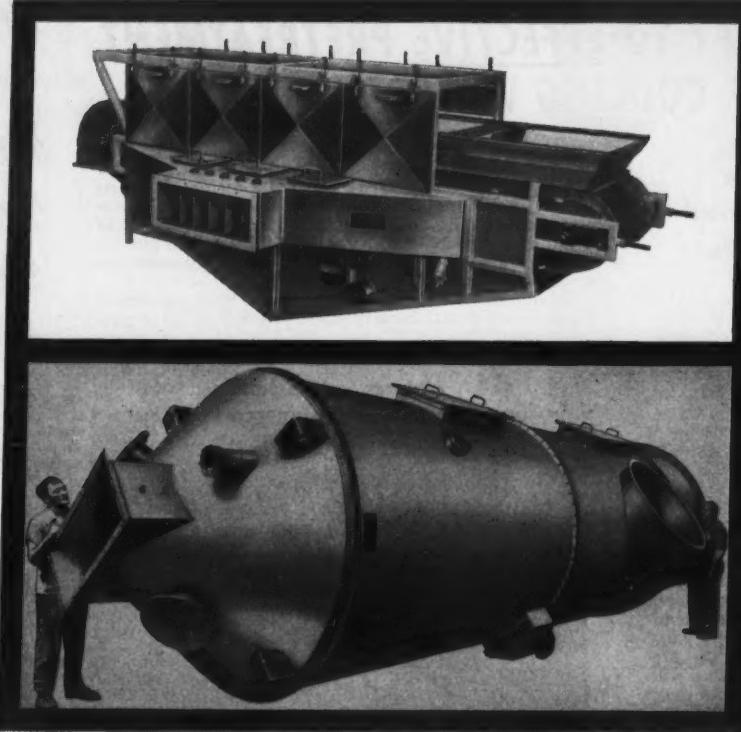


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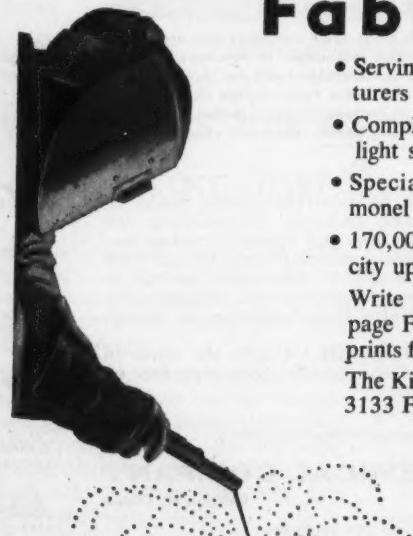
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Check 2416 opposite last page.

CHEMICAL MATERIALS

High UV resistance provided by acrylic for paint

Uses: Product can be used to formulate clear coatings to overcoat or finish textiles, paper, metals, plastics, and wood. Other applications include use in enamels for industrial maintenance work, multi-color and fluorescent paints, inks and as a bronzing agent in metallic paints.

Features: Material can be used to formulate a lacquer or air-drying coating with excellent resistance to ultraviolet light, according to the manufacturer. Produced in granular form, it is a versatile material that is easily processed and exhibits good resistance to heat, water, abrasion and outdoor exposure.

Description: Acrylic-based resin, Pliolite AC, is soluble in an aliphatic-aromatic solvent mixture with Kauri-Butanol (K-B) rating of 60. Resin is compatible with a large variety of other paint materials. It can be adapted to aerosol spray-can formulations.

Enamels, semi-gloss, flat and clear coatings based on the product resist acids, alkalies and various oils. Tests in Florida have shown that finishes based on the resin have unusual resistance to discoloration and chalking caused by exposure to ultraviolet light.

(Pliolite AC resin is a product of Chemical Division, The Goodyear Tire & Rubber Company, Akron 16, Ohio.) Check 2417 opposite last page.

High-solids formulations made at low viscosity with retarder solvent

Uses: High solvency retarder solvent is expected to find use as a replacement for many medium boiling solvents in formulations with nitrocellulose, ethyl cellulose, acrylic resins, half-second butyrate and vinyl copolymers.

Features: High solvent power permits formulation of products with high solids

Time and Tamms produce the products you need



For half a century we have had the privilege of providing basic ingredients to industry. While we welcome new customers, the great bulk of our business comes from accounts who have been on our books as long as two generations. Tight quality control is a tradition with Tamms, and this policy insures uniformity of product, a safeguard for the quality of your products or processes. We will be delighted to send samples, specifications, and prices.

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Dry Ground and Water Ground

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WHITE ROUGE



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TIME TESTED PRODUCTS FOR INDUSTRY

Check 2418 opposite last page.

CHEMICAL PROCESSING

CHEMICAL MATERIALS

content while maintaining a low solution viscosity. It has minimum retention in lacquer films since it is not as slow evaporating as many solvents of this type.

Description: Product is methyl isoamyl ketone. As a retarder solvent it promotes leveling and flow-out, and offers excellent blush control.

(Methyl isoamyl ketone is a product of Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Company, 260 Madison Ave., New York 16, N.Y.)

Check 2419 opposite last page.

Thermosetting resin for baking finishes is water soluble

It eliminates fire hazard and solvent toxicity

Uses: Product is designed specifically for industrial baking finishes. It should have wide application in high gloss, industrial top coat paints for steel drums, coated strip steel, and similar uses.

Features: Thermosetting resin overcomes three industrial painting problems. Being water soluble it eliminates fire hazard, solvent toxicity and odor. It has good wetting at all reductions, normally difficult to



Paint primer formulated with water-soluble resin can be applied by regular spray equipment

achieve in water-based systems. It has good oven baking characteristics after normal flash-off periods, unlike many water systems which require extensive air-dry time to avoid oven blistering.

Description: Water-soluble, thermosetting resin-Cargill 750—is being offered after two

years of laboratory and in-factory tests. It can be handled under normal production conditions and applied by regular spray equipment.

Here are the results of a baking primer test compared to a commercial epoxy ester automotive primer:

	750	Epoxy
Hardness (30 min at 300°F)	F	F
Impact resistance (in./lb)	28	28
Water resistance (135 hr @ 100°F)	Hard	Slightly soft
Salt spray, 220 hr (with alkyd mola-mine topcoat)	Excel	Excel

Dark color of 750 precludes its use in whites and pastels.

(Cargill 750 thermosetting resin is a product of Cargill, Inc., Minneapolis, Minn.)

Check 2420 opposite last page.

Wide compatibility found with finishing agents in textile softener

For use in wet processing with resins, or dyes

Uses: Softener and lubricant is recommended for use in textile wet processing. It is particularly suited for use as a lubricant for spun knitting yarns such as cotton, rayon, synthetics and blends.

Features: Product is compatible with a wide variety of finishing agents and can be used with resins, catalysts, dye fixatives, and dyes.

Description: Nonionic, white liquid (Sonofin 3639A) may be added to the resin bath without prior dilution. It is stable to acids, alkalis and salts, and resists oxidation and yellowing at elevated temperatures. It may be applied in conventional equipment. Manufacturer has found that 1 to 3% based on weight of yarn or fabric is adequate in most operations.

(Sonofin 3639A textile softeners is a product of Sonneborn Chemical and Refining Corporation, 300 Park Ave., South, New York 10, N.Y.)

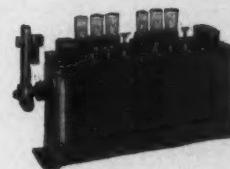
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HOW TO educate



a drop of oil!

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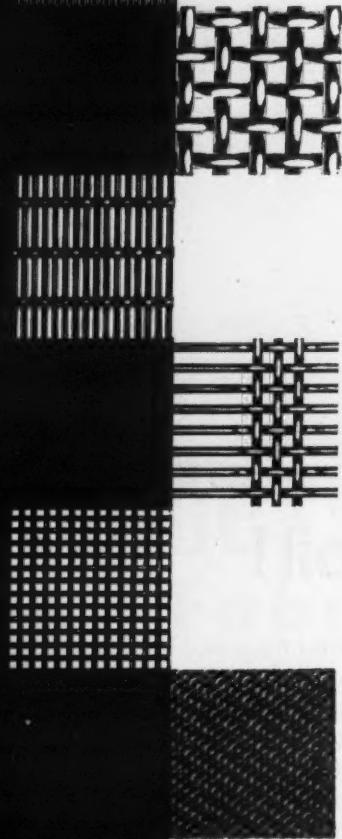


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Sunset Ave. & Valley Blvd., City of Industry (L.A. County), Calif.

Check 2423 opposite last page.

CHEMICAL MATERIALS

More members added
to group of alkoxy
metal compounds

Versatile series of aluminum and zirconium alkoxy compounds has been expanded to include seven new members. Compounds, together with some specific uses, are:

Aluminum chelate PEA-1: crosslinking agent; hydrophobic intermediate; drying oil modifying agent; adhesion promoter.

Aluminum chelate PEA-2: catalyzing agent for curing epoxy resins.

Aluminum chelate BEA-1: curing agent for epoxies, phenolics, castor-oil alkyls and high molecular weight polymers; adhesion promoter.

Aluminum tri-tridecylate: defoamer; hydrophobing agent.

Aluminum N-butoxide: ester exchange catalyst; defoamer ingredient.

Aluminum secondary butoxide (distilled): aid for curing epoxies, phenolics and other resins containing carboxyl or hydroxyl groups; water-repellent intermediate.

Zirconium N-butoxide: crosslinking agent; silicone curing agent; adhesion promoter.

(For more details on aluminum and zirconium alkoxy compounds contact The Harshaw Chemical Company, 1945 East 97th St., Cleveland 6, Ohio.)

Check 2424 opposite last page.

Can you use NON-SWELLING ABSORPTIVE

Montmorillonite



PIKES PEAK® CLAY

Approximate chemical analysis

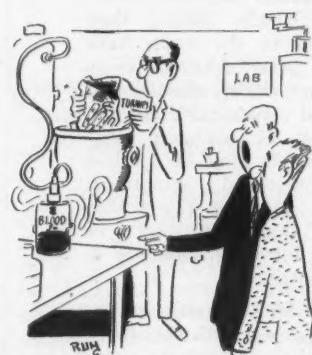
Loss @ 105°C.	0.60%
Further Loss on Ignition	3.25%
Silica (SiO_2)	73.77%
Alumina (Al_2O_3)	12.68%
Ferric Oxide (Fe_2O_3)	4.16%
Magnesia (MgO)	3.80%
Calcium Oxide (CaO)	0.34%
Ferrous Oxide (FeO)	0.08%
Sodium Oxide (Na_2O)	0.04%
Potassium Oxide (K_2O)	0.09%
Titanium Dioxide (TiO_2)	0.79%
Arsenic Oxide (As_2O_3)	0.00056%
Mercuric Oxide (HgO)	Less than 0.00005%*
Lead Dioxide (PbO_2)	Less than 0.00007%*
Phosphorus Pentoxide (P_2O_5)	0.22%
Sulfate (SO_4)	0.17%
pH around 5	
None found.	

Currently used as:

- Carrier (liquids & solids)
- Diluent • Extender
- Coagulant Aid
- Parting Agent
- Coating Agent
- Bleaching of chemicals, animal, mineral & vegetable oils
- Filter Agent
- Absorbent for liquids, chemicals, greases, oils

PHYSICAL PROPERTIES — Like all mined products of this nature, physical properties of Montmorillonite will change in various degrees, determined by mesh size and quantity.

WRITE FOR SAMPLES — Write immediately for necessary samples, mesh sizes available and other technical data for further exploration into advantages of Montmorillonite in suiting your specific needs.



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Check 2425 opposite last page.

CHEMICAL PROCESSING

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U.S.I. CHEMICAL NEWS

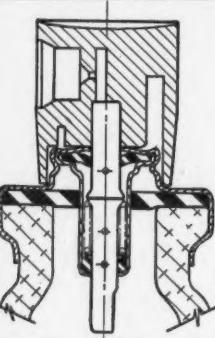
★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★

New Filling Technique Spurs Use of Metered Valves for Aerosols

In recent months a practical, volume-production method has been developed for pressure-filling aerosol containers through metering valves. Advantages claimed for pressure-filling over cold-filling techniques for metered valves: water-based systems can be handled; no danger of chemical change caused by cooling. As a result, it is felt that the new technique will lead to more widespread use of metered aerosols, particularly for drugs and cosmetics.

A metering valve has two ports—inlet and outlet. When the actuating button is pressed, both ports are operated. The inlet port closes to shut off the product in the container. The outlet port opens to let the product trapped in the valve expand and

MORE ➤



Cross-section of metered valve shows 2 lower ports for pressure filling. (Diagram courtesy of Emson Research)

New Data Sheet on Diethyl Carbonate Offered by U.S.I.

Specifications, properties, commercial information, typical reactions and uses of diethyl carbonate are detailed in a new technical data sheet just released by U.S.I. The material is a medium evaporating nitrocellulose solvent having mild odor, good stability and extremely low acidity. It is considered as nearly neutral an ester solvent as it is possible to make.

Diethyl carbonate is also used as a solvent for synthetic and natural resins, and lacquers such as those required for coating the cathodes of radio tubes. The material is also employed for organic syntheses.

For a copy of the new data sheet, contact your nearest U.S.I. sales office or Technical Literature Dept., U.S.I. Chemical News, 99 Park Ave., New York 16, N. Y.

U.S. Anhydrous Ammonia Production Up 10% in 1960

Versatile Chemical Employed in Agriculture, and by Industry in Wide Range of Operations from Drug Manufacture to Explosives.

The U.S. Department of Commerce reports that in the first six months of 1960, 2.5 million short tons of synthetic anhydrous ammonia were produced in this country—10% more than in the same period in 1959. This increase brings production up 80% since 1954. It reflects the growing importance of the material, not only for fertilizer purposes, but for a wide range of industrial operations as well. Most important industrial uses include:

Polyethylene Liners in Collapsible Containers Used to Haul Bulk Liquids

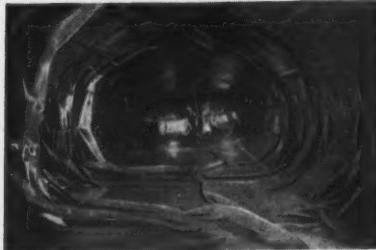
Disposable polyethylene liners are now being used within large collapsible containers to haul liquids which must be kept free of contamination in transit. Recently introduced for carrying edibles such as milk, fruit juices and vegetable oils, the lined containers have possibilities for many other raw materials as well.

These containers can be carried on any van or flat-bed trailer, including refrigerated vans, it is reported. They come in 22-, 30-, or 34-foot sizes, with capacities of 2,750, 4,000 and 4,600 gallons.

To free the vehicle for transporting dry freight following delivery, the disposable polyethylene liner is removed and the container is rolled into a compact package. For reuse, the container is unrolled on the floor of the vehicle and inflated. A new, sanitary polyethylene liner is then easily spread within the container and also inflated.



Collapsible container is unrolled on floor of trailer, inflated with low-pressure air.



Polyethylene liner is spread inside and inflated, and container is ready for loading.

Ammonia in Chemical Processes

Ammonia is important in the production of pharmaceuticals such as sulfa drugs, vitamins, antimalarials, amino acids.

Petroleum refiners employ ammonia to neutralize acids in oil to protect equipment from corrosion. For this purpose it is low-cost, has a high diffusion rate in oil, and neutralizes acidity without forming water. Products of neutralization are easily eliminated and excess ammonia can be removed by aeration. It can be introduced into equipment by its own vapor pressure.

Ammonia in Explosives

The explosives industry is one of the largest industrial consumers of ammonia. Nearly all industrial and military explosives contain nitrogen derived from ammonia by way of nitric acid or amines.

Ammonia in Textiles and Plastics

Rayon makers use ammonia to produce ammoniacal copper hydroxide solutions for dissolving cotton linters. In nylon manufacture, it is a raw material for hexamethylenediamine. It also plays a part in making acrylonitrile fibers.

The plastics industry employs ammonia in producing urea formaldehyde resins, and for making hexamethylenetetramine—catalyst and pH control agent in production of phenol—and urea-formaldehydes.

Ammonia in Pulp and Paper

An increasingly important application for ammonia is its substitution for lime in bisulfite wood pulping. It is claimed that ammonium bisulfite produces pulp of better quality, greater yield, reduces steam consumption, and makes possible the use of some hardwoods previously considered unusable. Conversion is inexpensive.

Ammonia in Metal Working

The most important use of ammonia here is in case hardening of steel by nitriding. Ammonia vapor is passed over steel parts in a furnace at 900° - 1,000°F. It dissociates, producing "active"

MORE ➤

U.S.I. CHEMICAL NEWS

CONTINUED

Ammonia

nitrogen which reacts with steel to form a hard layer that resists wear at operating temperatures up to 750°F.

Ammonia as Refrigerant

Ammonia is one of the oldest and best refrigerants, and the most widely used in large installations. Advantages include low cost, low power consumption, low friction and vapor density, and high heat of vaporization.

Ammonia for Water Purification

In industrial and municipal water supplies, ammonia and chlorine in about a 1:4 ratio form mono and dichloramines which are delayed sterilizing agents. They permit higher residual chlorine concentrations without chlorine taste and odor.

Fertilizer applications account for over 75% of all ammonia produced, particularly in the Mid-West around U.S.I.'s ammonia plant at Tuscola, Ill. Consumption breakdown for other industries is:

Chemical Processes.....	7%
Explosives.....	5%
Synthetic Fibers.....	3%
Plastics & Resins.....	3%
Pulp & Paper.....	1.5%
Metallurgy.....	1%
Miscellaneous.....	3.5%

CONTINUED

Aerosol Valve

escape. In pressure-filling through this type of valve, the liquid propellant being injected must somehow get past the seal of the inlet port and into the container.

This problem has been solved in valve design by adding two ports to the bottom part of the valve stem. A special attachment on the standard pressure-filling head depresses the valve to its limit. The two added ports then bypass the inlet port seal and provide a passage through the valve stem into the container for injection of propellant.

U.S.I. Names New V.P.

Paul J. LaMarche has recently been named Vice President of Production for U.S.I. Mr. LaMarche joined the company in 1949. Shortly thereafter, he became Manager of Sodium Sales. From 1951 to 1958, he was Manager of the company's plants at Ashtabula, Ohio. He became Director of Production in 1958.



Paul J. LaMarche

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Dehydrated firefly tails now available for biochemical research. Can be processed into extract used to measure ATP (adenosine triphosphate). ATP, added to extract, produces light in proportion to quantity of ATP present. No. 1672

Pliable, easily cut refractory sheet for laboratory use is now on market. Reported to be excellent insulator when hardened in air or 350°F oven. Suggested for hand grips, pump jackets, insulation for vessels, small ovens. No. 1671

New, highly-purified form of cellulose for food, drugs, cosmetics, now obtainable in research quantities. Said to give very firm, stable, opaque, creamy gels that are smooth, odorless, tasteless, non-caloric. In dry, free-flowing form, said to absorb fats and oils. No. 1672

New "Journal of Chemical Documentation" to be published twice a year, starting in 1961. Designed to ease dissemination of chemical information. Will cover such topics as information services, machine processing of information, resources of nations on specific subjects. No. 1673

Treating polyethylene film for printability is covered in new booklet now available. Discusses physical treatments by flame and the more adaptable electronic methods. No. 1674

High-purity isophthaloyl and terephthaloyl chlorides now produced in semi-commercial quantities. Suggested as raw materials for new synthetic fibers; intermediates for pigments, drugs, adhesives, rubber. No. 1675

Continuous addition of liquids to solids in precise amounts is reportedly achieved by new process recently developed. Thorough mixtures are provided at rates from 500 pounds to 150 tons per hour, it is claimed. No. 1676

New polycyclic alcohol is said to supply perfumer with all desirable characteristics of natural sandalwood oil—in a single aromatic chemical. Reported to have better residual properties than sandalwood itself. No. 1677

Use of radioactivity in developing and employing pharmaceutical agents is subject of 180-page book now being sold. In series of papers, experts discuss uses in analysis, product development and evaluation, tracing of drugs. No. 1678

Microporous cellulose acetate membrane is offered as improved medium for electrophoresis. Advantages claimed: speed, sharp separation, reproducibility, sample economy, chemical inertness, membrane strength, broad scope. No. 1679

PRODUCTS OF U.S.I.

Heavy Chemicals: Anhydrous Ammonia, Ammonium Nitrate, Nitric Acid, Nitrogen Fertilizer Solutions, Phosphatic Fertilizer Solution, Sulfuric Acid, Caustic Soda, Chlorine, Metallic Sodium, Sodium Peroxide.

Organic Solvents and Intermediates: Normal Butyl Alcohol, Amyl Alcohol, Fuel Oil, Ethyl Acetate, Normal Butyl Acetate, Diethyl Carbonate, DIATOL®, Diethyl Oxalate, Ethyl Ether, Acetone, Acetoacetanilide, Acetoacetyl-Ortho-Chloranilide, Acetoacetyl-Ortho-Toluclidide, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethylene, Ethyl Sodium Oxalacetate, Sodium Ethylate, Urethan U.S.P. (Ethyl Carbamate), Riboflavin U.S.P.

Pharmaceutical Products: DL-Methionine, N-Acetyl-DL-Methionine, Urethan USP, Intermediates.

Ethyl Alcohol: Pure and all denatured formulas; Anhydrous and Regular Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL®, ANSOL PR

PETROTHENE® . . . Polyethylene Resins

MICROTHENE . . . Finely Divided Polyethylene Resin.

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CHEMICAL MATERIALS

Waxed products clearer when based on this pure white wax

Uses: It is intended for emulsion or paste polishes; ingredients for manufacture of waxed paper, cartons, or containers; and can also be used in cosmetics, textile chemicals or plastics.

Features: High-melting microcrystalline wax is pure white. Improved microcrystalline structure results in higher oil retention and solvent absorption properties.

Description: Wax is produced by Thermoform continuous percolation bleaching process. It has a melting point of 195-200°F and no odor. Flash point (COC) is 595°F.

(White Mekon microcrystalline wax is a product of Warwick Wax Division, Western Petrochemical Corporation, Two West 45th St., New York 36, New York.)

Check 2426 opposite last page.

Added durability given high-density poly

Uses: Properties of high-polyethylene make it exceptionally suitable for blow-molded articles, insulation for wire and cable, and extruded pipe.

Features: Process used imparts high environmental stress cracking resistance as well as resistance to temperature embrittlement. Ease of processing is maintained.

Description: High-density polyethylene will be available in three grades of 0.95 density with molecular weights of 50,000, 80,000 and 100,000. In laboratory tests, two of three available grades rated higher "hours-to-failure" in environmental stress cracking resistance than all other comparable material, according to the manufacturer.

(Ameripol polyethylene is a product of Goodrich-Gulf Chemicals, Inc., East Ohio Building, Cleveland 14, Ohio.)

Check 2427 opposite last page.



SAVE 6.3¢ A POUND

On the basis of combined sulfur, sodium sulfhydrate is a far better buy than sodium sulfide. You get 62.6% more sulfur for a given weight of both products, which gives the sulfhydrate an edge of 6.3¢ a pound.

But that's not all. Hooker sodium sulfhydrate has high purity, 70% to 72% NaSH, most of the remainder being water of crystallization. Metallic contamination is kept to the order of 1 ppm for Cu, Ni, Cr, Mn, Pb. As low as 5 ppm for Fe.

Other advantages: rapid-dissolving flakes, even in cold water; little or no sedimentation; low alkalinity as compared with sodium sulfide.

We always ship in new, lacquer-lined drums which have full-open heads. The inert lacquer lining protects the product completely during shipment and storage. The full-open head makes for maximum ease in handling and charging your process.

See coupon for data sheet.

A SPECIAL TRICHLOR... NIALK® EXTRACTION GRADE

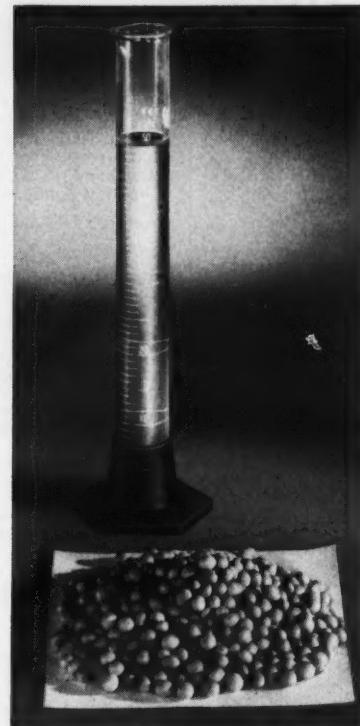
When you're extracting natural substances like vegetable oils, waxes, animal fats, or botanicals, use a trichloroethylene that really fits your process.

BRIEFS

sodium sulfhydrate vs. sulfide a dependable organic solvent and intermediate phosphorus pentachloride reaction

Our Nialk® extraction grade boils between 86.6 and 87.4°C. Its acidity, as percent HCl, is zero. Alkalinity, as percent NaOH, is only .006 to .008. Free halogen—none. No cloud at minus 12°C.

Moreover, our product meets these specifications *at all times*.



IT'S IN THE "JOURNAL"

If you've ever wondered about the mechanism for the reaction of phosphorus pentachloride with ketones, we refer you to the August 20, 1959, *Journal of the American Chemical Society* for an interesting article offering several equations you may find useful. Incidentally, we make phosphorus pentachloride, a yellowish crystalline powder with a melting point of about 148°C. under slight pressure. Ordinarily it sublimes at about 160°C. at atmospheric pressure. Among its uses: a substitute for the oxychloride to obtain tricresyl phosphate; as a general chlorinating agent and catalyst; for organic synthesis. It finds much of its usefulness in pilot plant applications where its solid state is suited to small reactors. Check coupon for data.

For more information, check here and mail with name, title and company address:

- | | |
|--|--|
| <input type="checkbox"/> Sodium sulfhydrate data sheet | <input type="checkbox"/> Trichloroethylene data sheet |
| <input type="checkbox"/> Sodium sulfide data sheet | <input type="checkbox"/> Phosphorus pentachloride data sheet |

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Check 2429 opposite last page.

For more information on product at left, specify 2428 opposite last page.

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Check 2431 opposite last page.

NEW LITERATURE

Chemical Materials

Broad spectrum of cationic and non-ionic surface active agents are described in four-page booklet. Compounds discussed range from fatty nitrogen derivatives to polyether alcohols. Data includes physical characteristics and uses. Bul K6 — Nalco Chemical Co.

Check 2432 opposite last page.

Brochure on urethane foams is a 24-page, dual-purpose pictorial progress report and designer's fact file on industrial and commercial applications. It presents an up-date and comprehensive review of the present and future scope of urethane foam products and market. "Urethane Foams" — Mobay Chemical Company.

Check 2433 opposite last page.

Latest technical information on 14 organic chemicals as well as details on custom manufacturing are presented in technical brochure. Compounds are primarily intermediates ranging from betalanine to piperidine. Bul 347 — Abbott Laboratories, Chemical Marketing Division.

Check 2434 opposite last page.

Exterior paints made with acrylic resin, water-based emulsion are the subject of a seven-year study of formulations, applications and exposure tests reported in "Progress Report #7" — Rohm & Haas Company.

Check 2435 opposite last page.

Use of castor polyols in urethane coatings is subject of six-page "Application Newsletter." Various formulations, applications and properties are discussed in detail. Application Newsletter No. 59 — Baker Castor Oil Company.

Check 2436 opposite last page.

"Organic Solvents and Chemicals," is a 64-page booklet of chemical properties, formulae and other information that has been completely revised and redesigned. In handy pocket size, it has been designed to provide quick and authoritative information on some 150 chemical products — Chemical Solvents, Inc.

Check 2437 opposite last page.

Titanium tetrachloride handling procedures are covered in illustrated 16-page brochure. Physical properties, a typical analysis, and charts on viscosity and vapor pressures are also included. "Titanium Tetrachloride" — Columbia-Southern Chemical Corporation, Subs. of Pittsburgh Plate Glass Co.

Check 2438 opposite last page.

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-10° to + 90° F.	24 Hours	
30° to 60° F.	7 Days	
40° to 100° F.	24 Hours	
40° to 130° F.	24 Hours	
50° to 90° F.	24 Hours	
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*U. S. Patent Nos. 2,833,567 and 2,731,279. "super gem" is an Aeroquip Trademark. Teflon is DuPont's trade name for its tetrafluoroethylene resin.

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CHEMICAL PROCESSING

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like materials have been created at the B. F. Goodrich Company's research center by scientists working with acrylic monomers containing aromatic groups.

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For more information on product at right, specify 2441 see information request blank opposite last page.



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CHEMICAL MATERIALS

Entire line of catalysts for gas processes, petroleum and chemical industries, food processing and other applications is described in 16-page catalog. Properties and uses are given for commercially proven catalysts as well as data on catalysts available for customer use in research and process investigation. Cat GC 2000A — Girdler Catalysts, Chemical Products Division, Chemetron Corp. Check 2442 opposite last page.

Instability of polyolefins in presence of light and oxygen is subject of brochure which covers polyethylene, polypropylene and polyvinyl plastics. Brochure describes the deteriorating effect on these polymers and outlines advantages of recently introduced stabilizer, Voidox. Voidox Brochure — Guardian Chemical Corporation. Check 2443 opposite last page.

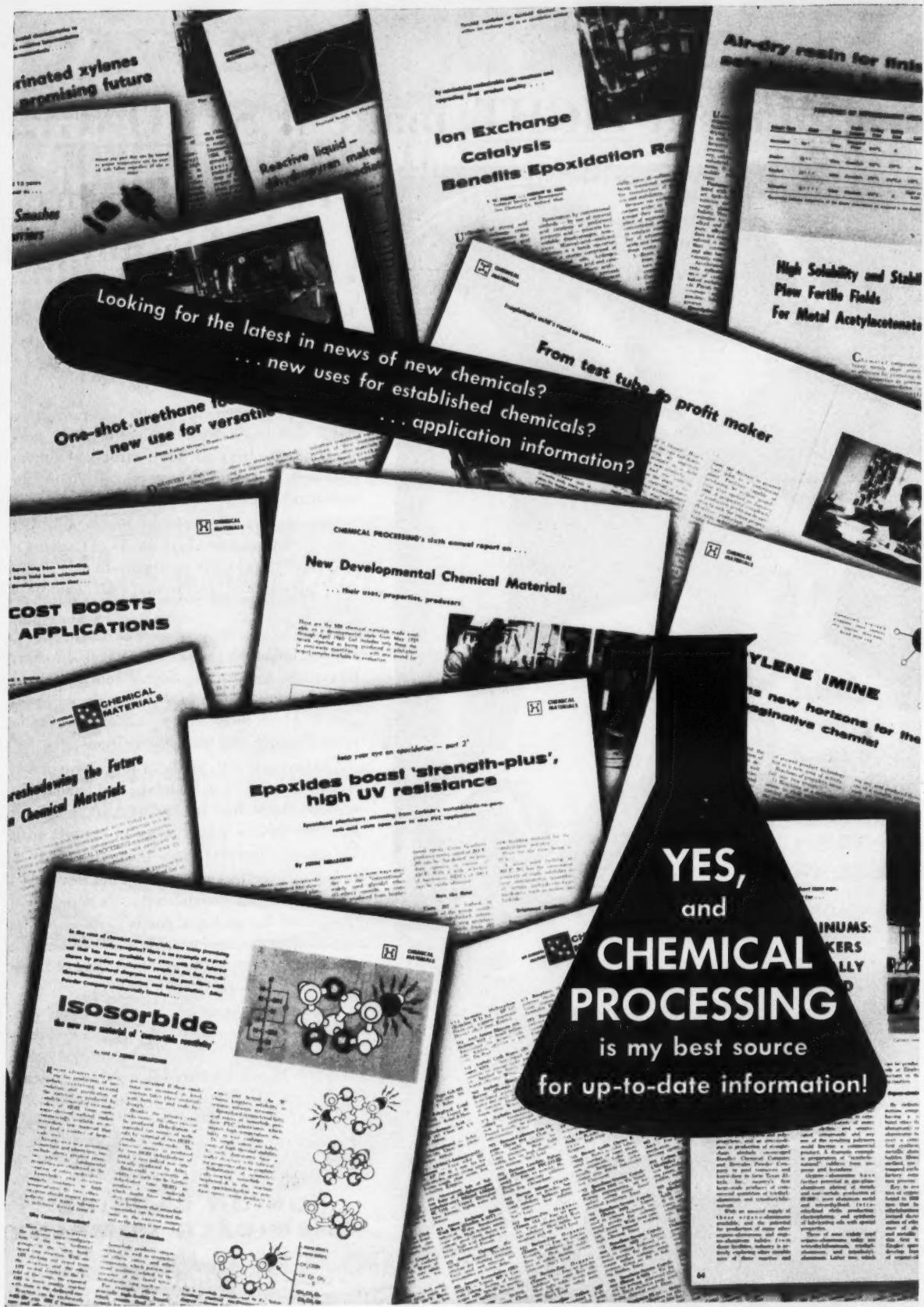
Paint, paper, textile and building product use areas are emphasized in 16-page, pocket-size folder of company's latexes. Styrene-butadiene, polystyrene, vinyltoluene-butadiene, saran, vinyl and acrylic latex families are included. "Latexes of The Dow Chemical Company" — The Dow Chemical Company, Plastics Sales Dept. Check 2444 opposite last page.

Formulation of latex systems containing aluminum pigments is discussed in five-page technical bulletin. Pigmentation, precautions and licensing are some of the topics covered. Tech Bul 110 — Metals Disintegrating Company, Inc. Check 2445 opposite last page.

Almost 3000 detergents and emulsifiers are listed alphabetically by trademark in 127-page booklet. Information given covers company name, class and formula of product, main uses, form, and data concerning specifications and nomenclature. "Detergents and Emulsifiers — Up To Date 1960" can be obtained at \$3.50 per copy from John W. McCutcheon, Inc., 475 Fifth Ave., New York 17, N.Y.

Coconut fatty acids are subject of booklet which provides specifications on caprylic, capric, lauric and myristic acids as well as stripped and distilled coco acids and a capric-myristic blend. "Coconut Fatty Acids" — Armour Industrial Chemical Company. Check 2446 opposite last page.

Markets, products and company history are presented in 36-page booklet titled "This is Cyanamid" — American Cyanamid Company. Check 2447 opposite last page.



CHEMICAL MATERIALS

Results of tests on polyethylene formulations with high resistance to sunlight and outdoor weathering are described in bulletin. Formulations incorporate a non-pigment ultraviolet inhibitor which is thoroughly homogenized in base resin during production. Bul #5 — Plastics Division, Eastman Chemical Products, Inc., subs of Eastman Kodak Co.

Check 2448 opposite last page.

Treatise on vat-dyeing techniques for cellulosic fibers, in 120-page publication, treats application, properties and uses of company's Indanthrene vat dyes on cellulosic piece goods. A complete description of techniques, formulations and methods is presented. Bul GDC-351T — General Dyestuff Company, Division of General Aniline & Film Corporation.

Check 2449 opposite last page.

Synthetic magnesium silicate with porous structure is described in three-page product bulletin. Specifications, chemical properties and suggested uses are outlined. Product bulletin W103 — Waverly Chemical Co., Inc.

Check 2450 opposite last page.

Brochure on sulfuric acid features enthalpy curves which, for the first time, enable sulfuric users to calculate heat developed and final temperatures when acid is diluted with water. Profusely-illustrated, 40-page data book includes the latest information on uses, manufacture, properties, storage, handling and methods of analysis. "Sulfuric Acid" — General Chemical Div., Allied Chemical Corp.

Check 2451 opposite last page.

Polyurethane one-can stable prepolymers are discussed in technical service bulletin of five pages. Information given includes approximate analyses, clear film properties and a comparison of chemical resistance. TS-6085 — Spencer Kellogg and Sons, Inc.

Check 2452 opposite last page.

Epoxy handling equipment is subject of 10-page reprint from material presented at University of Wisconsin Seminar on epoxy resins. Items included are spray guns, pumping units and applications. Requisites for proper epoxy spray are also discussed. "Recent Advances in Epoxy Handling Equipment" — Union Carbide Plastics Company, Div., Union Carbide Corporation.

Check 2453 opposite last page.

For more information on developments in this section, check the Reader Service Slip.



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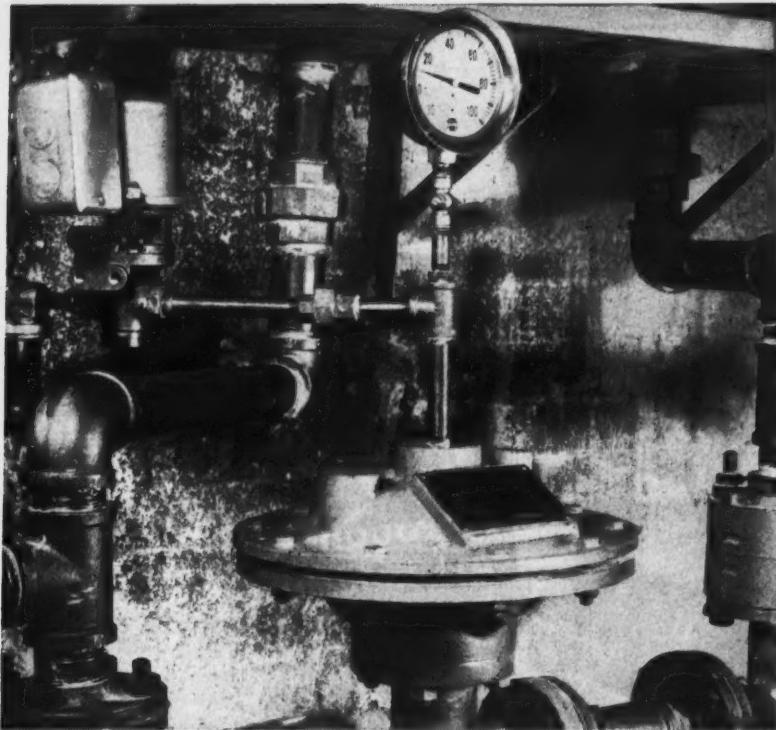
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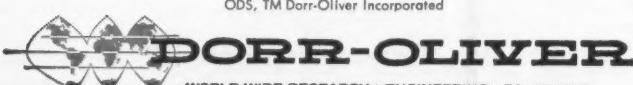
CERAMIC SLURRY TRANSFER HANDLED BY **ODS DIAPHRAGM PUMP** *at Leviton Manufacturing Company*

The 1½" rubber lined ODS diaphragm-type pump shown above plays a key role in the manufacture of quality electrical wiring devices at Leviton Manufacturing Company's Brooklyn, N. Y., plant. In operation since early 1958, the unit handles an abrasive ceramic slurry on its way to the glazing operation.

For tough, abrasive and/or corrosive slurry handling service, the ODS has been proven hard to beat. The diaphragm is operated pneumatically, requiring no mechanical linkage that can be a source of leaks and maintenance problems. A wide range of construction materials and linings is available.

Materials handling ability ranges from clear liquid to slurries containing up to 85% solids. Bulletin No. 5030 gives complete information... for your copy, write Dorr-Oliver Incorporated, Stamford, Connecticut.

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Check 2455 opposite last page.

Foreign Investment in U. S. From page 26

in this country after World War II. Initially, \$15 million of British funds were invested, with the remainder being obtained from American banks and insurance companies. Now, organizationally coming under Bowaters' North American company in Canada, the Tennessee operation is about double its original size and has become the largest single newsprint plant in the United States. This mill makes Bowaters the third largest manufacturer of newsprint in this country.

Bowaters manufactures about 60% of all the newsprint produced in Great Britain. Considering all its production facilities, the Bowaters Organization is the world's largest producer of newsprint.

In South Carolina, Bowaters built a sulfate pulp mill. Operations began in 1959. A hardboard mill came into operation in 1960 and construction of a mill to produce printing papers is underway with completion scheduled for 1962.

British Dollars Return

The Bowaters plants represent the return of British investment to this country which was expended during World War II. A number of British plants were sold to American interests at that time to help pay for the cost of the war. The Courtaulds synthetic fibers plant in Alabama represents a similar situation. Courtaulds actually was in this country prior to World War II, while Bowaters was not. Courtaulds returned to the American scene in 1951.

Among other CPI industries besides paper, partially or wholly owned, the brewing and distilling industry stands out in accompanying table; note the three companies, all Canadian owned. Other industries representing substantial investment are Lever Brothers in soaps and detergents, and American-Saint Gobain in glass. American-Saint Gobain is building a \$50-million plate-glass plant in Greenback, Tennessee, which will be completed in 1962.

The investments shown in

the table have been made by eight countries, size of investment being in this order by country:

Great Britain
The Netherlands
Canada
Switzerland
Belgium
France
West Germany
Italy

In summary, the entry of these companies from abroad into chemical manufacturing in the U. S. is one more example of the chemical processing industry's becoming more world-wide in scope. U. S. industry is surging overseas to build chemical plants, and foreign companies are coming here.

Both of these trends are probably of overall benefit to the countries involved. Nevertheless, the chemical activity of foreign companies in the U. S. makes competition more severe and is a trend that should be watched closely by chemical management since each move may have an important effect on the operation and planning of individual companies. ■

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With what has been written in these articles.

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You might even have a thought or angle which wasn't expressed. If so, why not let us and others hear your ideas? Suitable letters will be published in the regular "Letters from Readers" columns. Address your comments to: The Editor, CHEMICAL PROCESSING, 111 E. Delaware Place, Chicago 11, Illinois

Creativity Rating

From page 33

able in the personnel files of the organization. Finally, the ratings were related, but not as strongly, to an "issued patents" criterion.

Data from Second Study
Not Yet Complete

As a second follow-up study, the forced-choice instrument was used by 10 research supervisors to evaluate 84 research personnel in a major electronics organization. At the time of this writing not all data are yet available. However, what is at hand indicates considerable differentiation by the forced-choice method between research personnel in relation to patent disclosures, patent applications, and actual patents issued.

It is recognized that ratings and patent data are not the only or perhaps the best criteria of creativity. Additional work is in progress which will hopefully develop more adequate criteria of research creativity.

Practical Application of the Method

The method described can be used for the evaluation of presently employed research personnel. Such an approach would be practical and useful, but an extension of the method is presently being studied. In the Pure Oil Company Research Center the method is now in use, in addition to letters of reference, to elicit ratings from college professors and/or previous research supervisors when a candidate for a research position is being considered for employment. Preliminary investigations indicate quite strong agreement between ratings from multiple raters. ■

(1) Sissen, E. D. Forced-Choice—The New Army Rating. *Personnel Psychology*, 1948, 1, 365-381.

(2) Buel, W. D. The Validity of Behavioral Rating Scale. *Items for the Assessment of Individual Creativity*. *Journal of Applied Psychology* (In press).

(3) Buel, W. D., and Bachner, V. M. Creativity: Its Assessment by Five Tests and a Forced-Choice Instrument. Submitted to *The Journal of Applied Psychology*.

(4) Not elsewhere reported.

Reverse-air jet filtering comes of age with the

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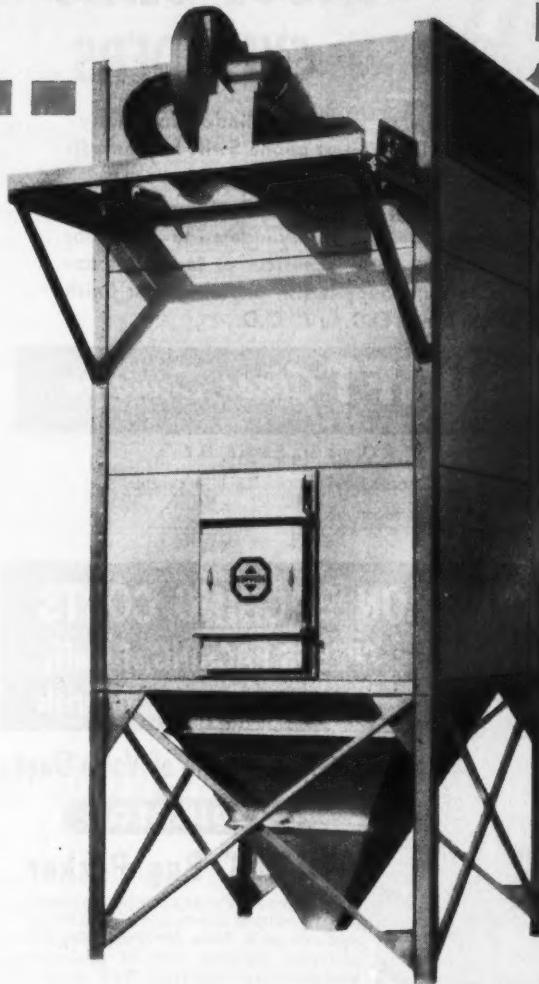
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NEW FEATURES

Koppers Model K Aeroturn has been completely redesigned for demanding industrial service—the only new reverse-air jet filter on the market. Such features as new blow rings, new carriage drive system and simplified, standardized design help you recover more product, cost less to operate and serve you more dependably.



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Check 2456 opposite last page.

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Two revolutionary improvements greatly widen the range of materials you can pack. New Air-Push Hopper provides positive flow of granular and powdery materials. New motorized Bag Shaker insures compact filling . . . reduces size of bags needed for fluffy materials.

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Check 2458 opposite last page.

Research in Europe

From page 37

to provide an effective bridge between the American sponsor's practical needs and the European scientist's basic creativity by what it terms "coupling."

"Coupling," explains ADL's Lawrence W. Bass, "is a communications process that develops insight or enlightenment in both parties. Counselling with the basic researcher must be done with understanding, so as to develop in him awareness of the possible importance of certain alternative paths his work may take with regard to new technological breakthroughs.

"But coupling is a two-way operation, and turned around, it translates basic research findings into possibilities of product or process innovation that both stimulate and encourage the practical sponsor.

"Incidentally," continues Bass, "we are using the term 'long-range research' instead of 'basic research' with business people, as we believe it more correctly expresses the objective . . ."

With individual overseas researchers, another type of problem can arise. "We have found it sometimes difficult to enforce an agreement as it pertains to patents and information in general which is made with an individual of a foreign country," reports another company spokesman.

One area in which American research management has wrought changes is in the use of technician aides. "It has been traditional in many countries for the research group to include only 1/4 to 1/3 professionals, the remainder technicians," reports one administrator. "Several U.S. employers have recently increased this ratio to about half professionals. It wasn't liked too well at first, but has been accepted as a practice."

Like Shooting A Missile

Communications has been and no doubt will continue to be the stickiest problem in conducting research programs abroad. "Managing an offshore research program is much like shooting a guided

416-PAGE



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Check 2459 opposite last page.

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Pumcups of various types are available in a complete range of sizes and texture-engineered compositions for your reciprocating pump and cylinder requirements.

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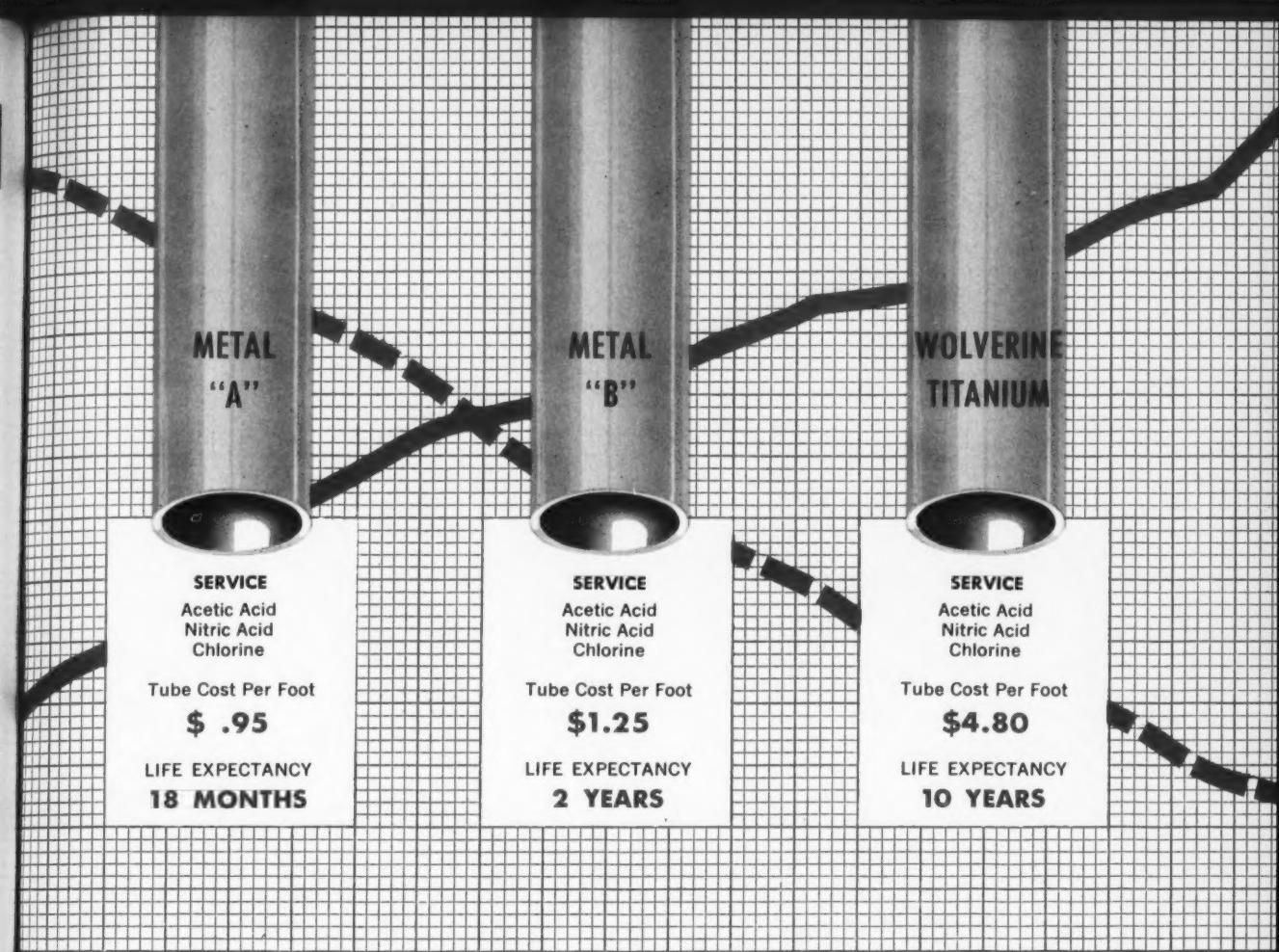
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TRADE MARK
PUMCUPs

Check 2460 opposite last page.



Consider the long range payout of Titanium vs standard metals and alloys

Wolverine Tube is certain that you know all about equipment payout—and how it can be affected by costly maintenance and downtime, particularly in corrosive services.

But perhaps you haven't considered how important it is to look beyond first costs—to get the big picture of what Wolverine titanium heat exchanger tubing can do for your company's long range requirements.

In addition to the services illustrated in the charts above, consider the increasing use of sea water for cooling purposes. Most ferrous and nonferrous alloys in this service have a tendency toward stress corrosion cracking and pitting. On the other hand, titanium is completely immune to these faults when handling salt water.

Thus, as in the services charted above, titanium heat exchanger tube, though having a greater first cost, is more economical in the long run because it gives greatly increased and uninterrupted service life.

It's a big subject and one that requires more space than we have available here. Why not talk it over with your Wolverine sales representative? He can point out in detail the many ways in which titanium heat exchanger tube can save you time and money.



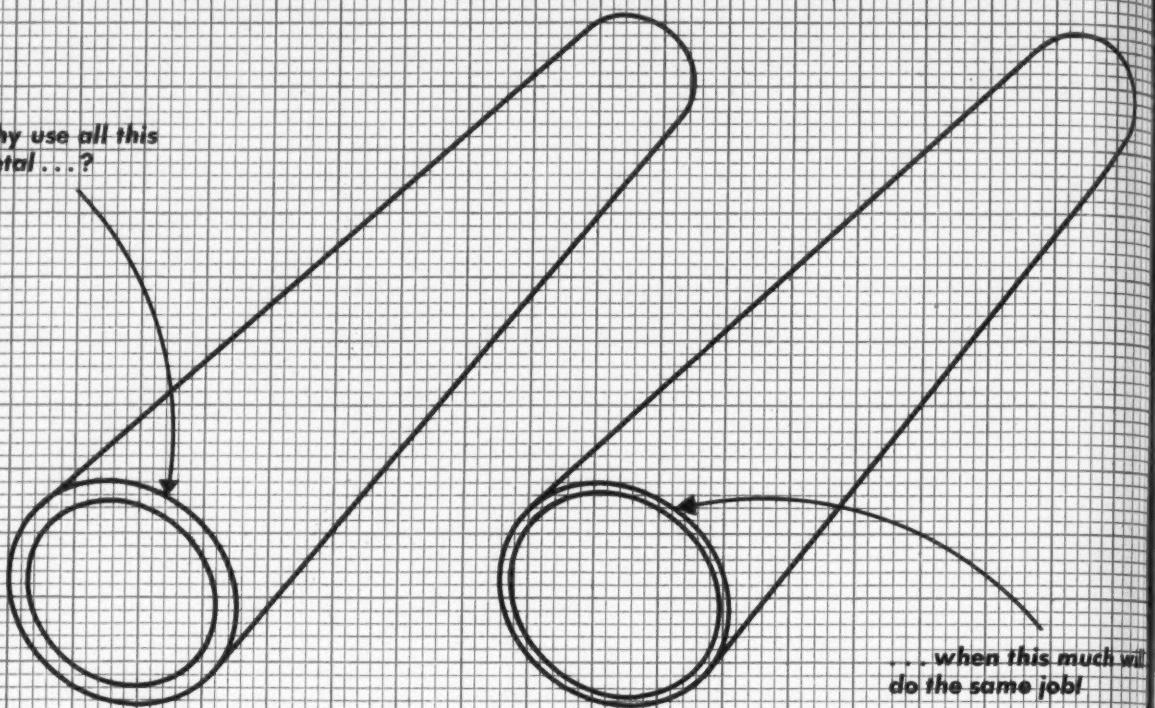
WOLVERINE TUBE

DIVISION OF

Calumet & Hecla, Inc.

DEPT. J, 17234 SOUTHFIELD RD., ALLEN PARK, MICH.
Manufacturers of Quality Controlled Tubing

Why use all this metal . . . ?



Wolverine Titanium Heat Exchanger Tube helps eliminate waste metal

When analyzing the effectiveness of titanium heat exchanger tubing, in comparison with standard metals and alloys, it must be remembered that because of titanium's great resistance to corrosion, a lighter walled tube can be used in many applications.

For example, Wolverine titanium heat exchanger tube with .049" wall thickness and less can successfully handle products such as acetic acid, nitric acid and chlorine—among others. When compared to the much heavier walled tubing in certain other metals normally used in such services, it is apparent that substantial savings can be made in both unit weight and structural support.

This important factor also helps reduce the end cost of titanium heat exchanger tube and makes this metal

even more attractive when compared to other metals having lower initial cost, but requiring heavier wall thickness because of their accelerated corrosion rate.

For complete information about Wolverine titanium heat exchanger tube, just talk to your Wolverine sales representative. He can give you the entire story about Wolverine's work in titanium and other special metals.



WOLVERINE TUBE
DIVISION OF
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missile at an airborne target," analogizes (4) Sylvania Research Labs' R. M. Bowie. Another executive cites the new low cost of round trips to Europe — \$350 — as simplifying the problem, at least expense-wise. But whom to send is still the problem.

"The man who will do the most good for you in Europe," admonishes (5) Linde Moser of International Minerals & Chemicals, "is one who knows Europe . . . its people . . . problems . . . has a sympathetic view towards the continent . . . speaks the language."

"Most Americans are handicapped by the language barrier," continues Moser. "Although it is true that all educated Europeans speak English . . . they are unable to express themselves (in it) clearly and concisely. Because of this, quite often they say nothing . . . (which is) especially true if several members of a company sit in on a meeting and the boss is around. The one who speaks

up . . . is not always the man who knows the most."

Worth the Hassle?

Now that the research-in-Europe honeymoon is over, is the effort worth the results? "There are urgent and very compelling reasons why we in the U.S. cannot afford to try to do everything ourselves," opines IBM's W. W. McDowell. Another authority, Monsanto's Carroll Hochwalt, believes, "we can avoid an insular manner of thinking by bringing in scientists trained in European universities."

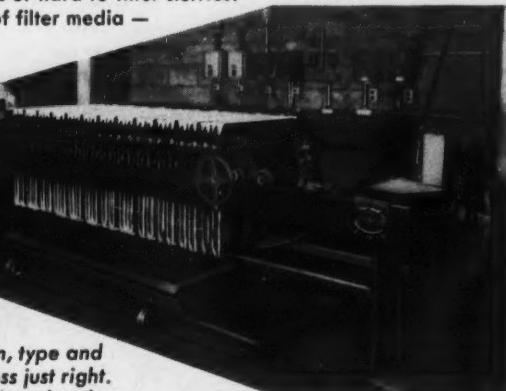
A further comment along this same vein comes from a Cyanamid spokesman: "A European scientist can be expected to approach a given problem with a somewhat different point of view than that which a U.S. scientist might adopt."

All of these are compelling arguments in favor of European science. But what about costs? "The concept of lower research costs does not appear to us to be a controlling fac-

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The Shriver vertical leaf filter is available in vertical tank and horizontal tank types, in a wide range of leaf and tank sizes. New Bulletin 150 tells the story.

FILTERS AND COMPLETE
FILTER STATIONS TO
MEET YOUR EXACT
PROCESSING NEEDS

T. Shriver & Company, Inc.

846 HAMILTON STREET • HARRISON, N.J.

Sales offices in principal cities

Check 2462 opposite last page.

For more information on product at left, specify 2461 opposite last page.

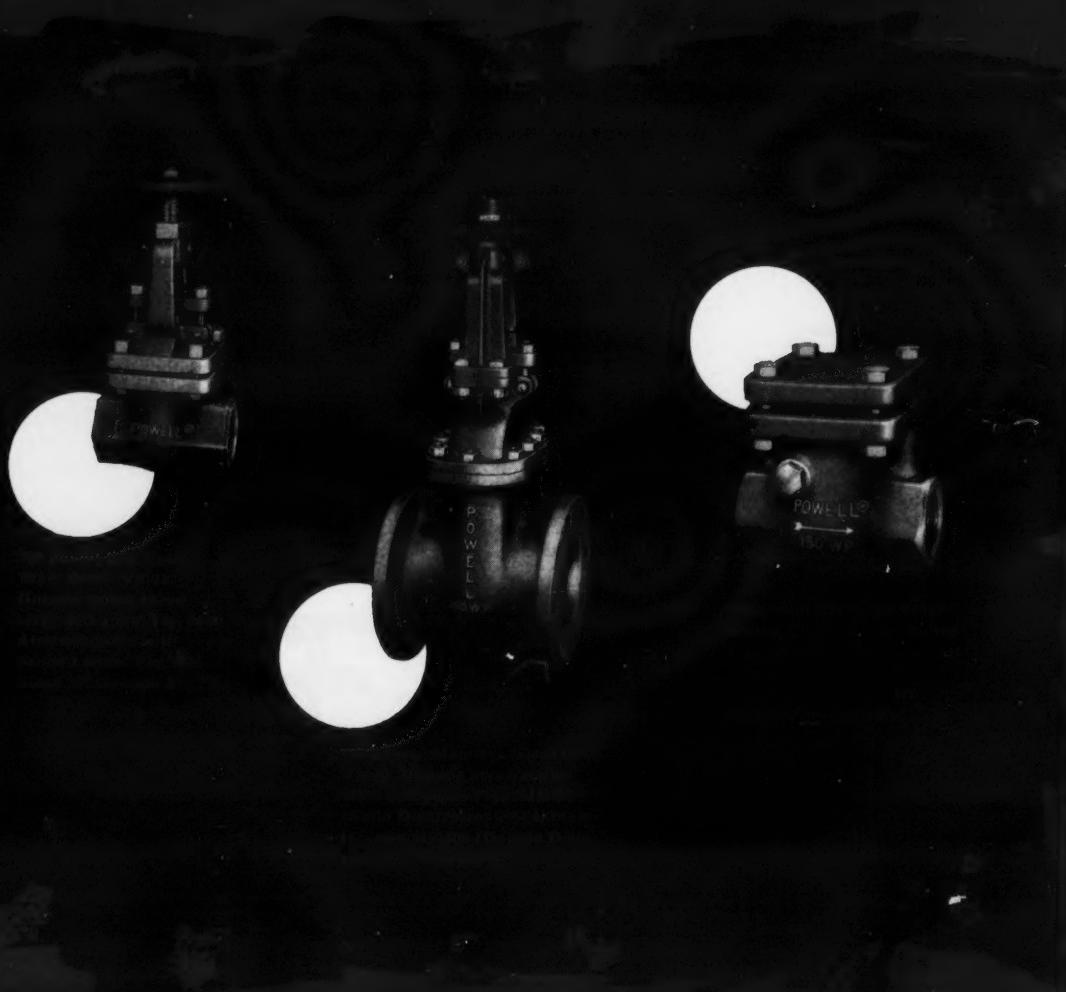
POWELL PERFORMANCE!

In solving their many problems — the chemical and process industries are the miracle makers of the 20th century. And in this magic crucible, Powell valves are used to control the flow of corrosive fluids — acids, alkalis, organic solvents, and gases... even under the most severe conditions.

Powell corrosion-resistant valves can be de-

signed and built to withstand temperatures up to 1,000° F., pressures up to 1,000 psi, and to withstand the most severe chemical environments of the oil, gas, and petro-

leum industries. These valves have been tested under the most severe conditions, and their performance has been proven over 115 years of industrial valve manufacturing experience at your service.



115th year of manufacturing industrial valves for the free world

POWELL CORROSION-RESISTANT **VALVES**

THE W.M. POWELL COMPANY



Check 2463 opposite last page.

Research in Europe

From preceding page

tor, nor one likely to be significant in the long run," says Hercules Powder Co.'s Robert W. Cairns, under whose supervision the firm is making unrestricted research grants to European (as well as U.S.) universities.

Long-range Benefits

"Fellowship and co-operation are characteristics of the scientist," forewords the NATO Group report (3), "but co-operation is not only a matter of exchanging information or of administration.

"It is far more a matter of inter-penetration among the nations, until we can no longer speak of British physics or French mathematics, but of physics and mathematics. In recent years, this quality of science has been distorted for various reasons by political obstacles. These obstacles must be surmounted and the effectiveness of Western science must be increased, first by a return to a greater unity, and second by a conscious effort on the part of statesmen to devote adequate resources to science."

Acknowledging all the practical, commercial reasons involved, it is submitted that one day the European scientist employment program as still under development by the great applicators of science to mass production — the American processing industries — will be viewed as having been a major factor in strengthening Western science. ■

Literature cited:

- (1) Anon. report, "The growing challenge of foreign competition," *Dust Review & Mod Indus.*, May 1959, p. 62.
- (2) McDOWELL, W. W., unpublished address before AMA mtg., New York City, March 30, 1959, "American industry & European research."
- (3) NATO Study Group of Science Comm. report, "Increasing the effectiveness of Western science," Fondation Universitaire, Brussels, 1960. Avail. National Science Foundation, Washington 25, D.C.
- (4) BOWIE, R. M., unpublished address before AMA mtg., New York City, March 31, 1959, "Aligning product programs with total company objectives."
- (5) MOSER, LINDE, unpublished address before AMA mtg., New York City, April 1, 1959, "Capitalizing on European science — how to go about it."

Accuracy obstacle hurdled . . .

Metering density and flow of 1:1 Coal Slurry

W. R. HUFF and L. F. WILLMOTT

Supervisory Chemical Engineers
Morgantown Coal Research Center
Bureau of Mines, Region V
United States Department
of the Interior
Morgantown, W. Va.

A NEW SOLUTIONS
FEATURE

ACCURATE METHODS of metering density and flow of coal slurry were needed for a gasification process recently developed at the Morgantown (West Virginia) Coal Research Center of the U.S. Bureau of Mines.

In the process (diagrammed here), bituminous coal is pulverized to a commercial grind of 70% through 200 mesh, with maximum particle size of 14 mesh. It is then mixed with water to make a 1:1 suspension by weight.

A positive-displacement pump delivers 1600 lb/hr of slurry through heating coil to produce mixture of coal and superheated steam. Mixture then passes to the gasifier, which operates at 100 to 300 psig.

In selecting density meter and flowmeter, a number of types were considered and tested. Among these were nuclear-resonance, gamma-ray, ultrasonic, capacitance and differential-pressure versions. For this particular situation, the most reliable combination found was that of pressure-differential density meter and magnetic flowmeter.

Density Metering Investigation

The first density meter used in the slurry-recirculation

system was type which records the difference in Δp across two equal lengths of pipe—one horizontal and one vertical. Zero reference is difference between two when water is flowing through system.

For this type of set-up to function properly with coal-water slurries, impulse lines must be kept free of coal particles. The only way found to accomplish this was by adopting a technique reportedly in use with thoria slurries (1). In this method, continuous water purge of eight cc/min flows into impulse lines.

After provision was made for the continuous water purge, density meter was sensitive to changes of 2.5% in coal content of slurry. Because meter was also sensitive to changes in flow of purge to

any of four impulse lines, these flows had to be rigidly controlled.

A variation on the above-described density-metering system was next investigated. It had been reported as being applicable to thoria slurries at high temperatures and pressures (2).

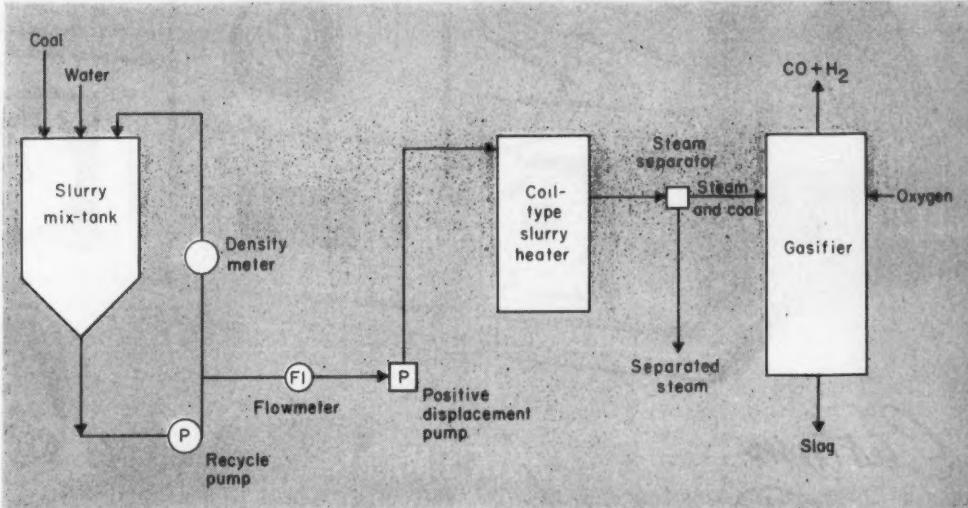
This pressure-bridge density meter requires only a single relay for differential-pressure determination. In operation, fluid to be measured flows in and out of a vertical loop at vertical mid-points. With water flowing through loop, meter reads "zero." Fluid velocity in loop has reportedly been varied in 1- to 7.5-ft/sec range without noticeable error in density readings (2).

An eight-ft-high x one-ft-wide pressure-bridge loop was constructed of one-inch pipe and installed in the coal-slur-

ry recirculation line. It is equipped with purges, a differential-pressure pneumatic relay and a recorder. The loop records coal concentration in 1:1 slurry to 1%, and is sensitive to changes of 0.5%—certainly an improvement over the first density metering set-up evaluated.

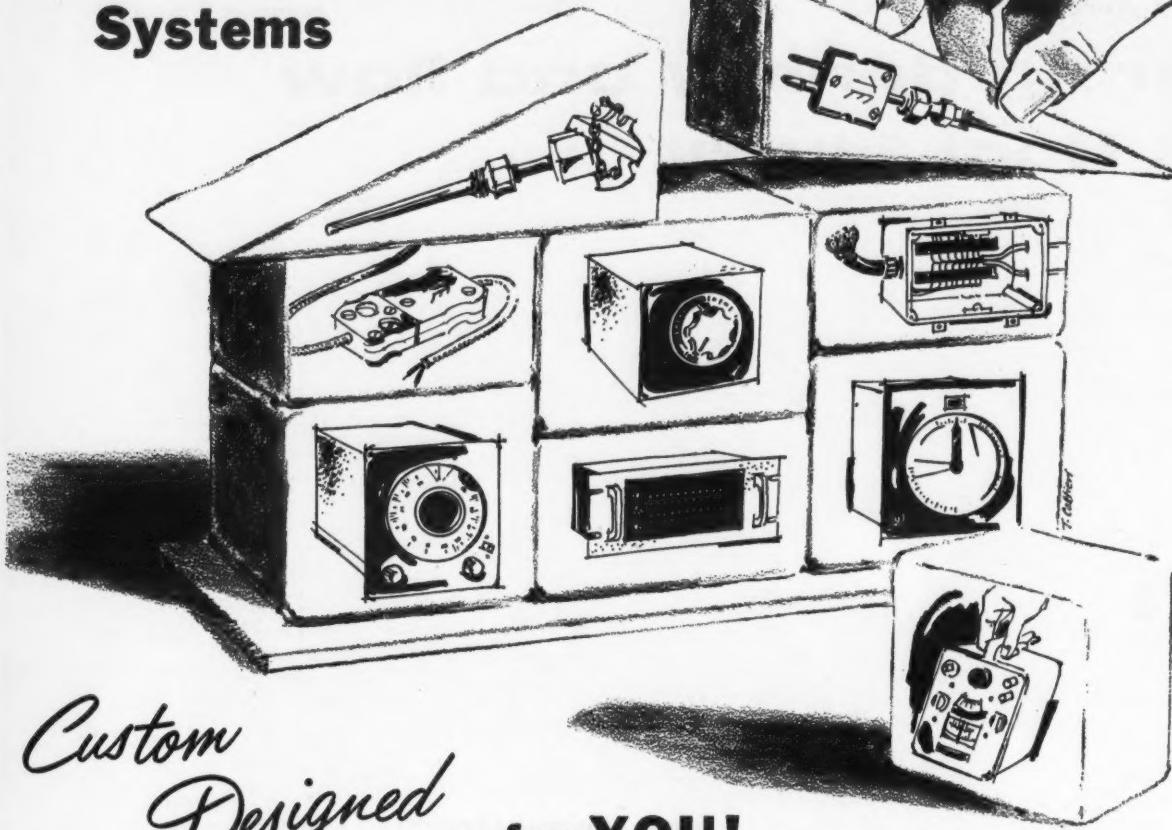
Integrating Measurement of Density and Flow

For flow measurement of the coal slurry, an electromagnetic-type meter was installed in suction line of positive-displacement pump. The range of the instrument is smallest available (zero- to five-gpm). However, it has been successful in handling the even smaller zero- to three-gpm range of coal-slurry system. It indicates changes in flow of 0.094 gpm (or equiv-



COAL-SLURRY GASIFICATION SYSTEM

Thermo Electric Temperature Control Systems



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Thermo Electric advanced systems-building components permit custom designing to satisfy your temperature monitoring, indicating, recording, or controlling requirements, exactly and economically. Starting with T. E. thermocouples—standard or special calibrations—from 1 inch to 66 feet and longer, accessories are carefully selected by T. E. applications engineers to relay any number of signals to your instrument panel. Quick-coupling plug and jack connectors and panels, extension wire and cable are precisely matched to eliminate false emfs. Junction boxes, rotary, key or push-button selector switches are all designed and constructed by T. E. to the highest quality standards.

To monitor, indicate, record or control process variables, T. E. offers the compact Signaling Controller—the Indicating Controller and Indicating Recorder with large, easily-read scales, or special multi-point monitor systems. All instruments have front-set controls, complete in-the-field range interchangeability, ease of service, and feature the new High Gain Relay or Servo Amplifiers with high sensitivity and exceptional stability.

The portable "MiniMite" Indicator with 23" scale and 0.25% scale accuracy, can be used to indicate on-the-spot temperature or for calibration and test work.

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INSTRUMENTS & LAB

lent of 25 lb of dry coal per hour).

In the work at Morgantown, no attempt has been made to integrate the flow- and density-meter signals to obtain a mass-flow signal. The choice of such a meter for use in a particular operation should be based on considerations like compatibility with system, pressure loss that can be tolerated and needed accuracy.

In the matter of grouping instruments to perform a desired function, a recent review on slurry metering is worth noting (3). In it is stated that, "although the electromagnetic meter for flow and the pressure bridge for density are the most accurate, if the electromagnetic flowmeter coupled with the ultrasonic density meter that has the smallest pressure drop."

(Electromagnetic flowmeter is product of The Foxboro Company, 8112 Neponset Ave., Foxboro, Mass.)

Check 2464 opposite last page.

Literature cited:

- (1) Wichner, R. P., and Kitze, A. S., "A Manometer System for A High Temperature Slurry Loop," Report of Run S-91, U.S. Atomic Energy Commission, ORNL CF-56-12-41, Dec. 7, 1956, 6 pp.
- (2) Wincher, R. P., and VanderBuck, C. F., "The Pressure Density Meter for Continuously Metering Densities of Flowing Streams," U.S. Atomic Energy Commission, ORNL CF-57-1-40, Jan. 10, 1957, 13 pp.
- (3) Wincher, R. P., "Slurry Flowmeters and Density Meters for the Homogeneous Reactor," U.S. Atomic Energy Commission, ORNL CF-57-9-96, Sept. 1957, 19 pp.



"I'm speaking . . . uh . . . I mean speaking."

THAT'S
INTERESTING

Rising use
of Teflon

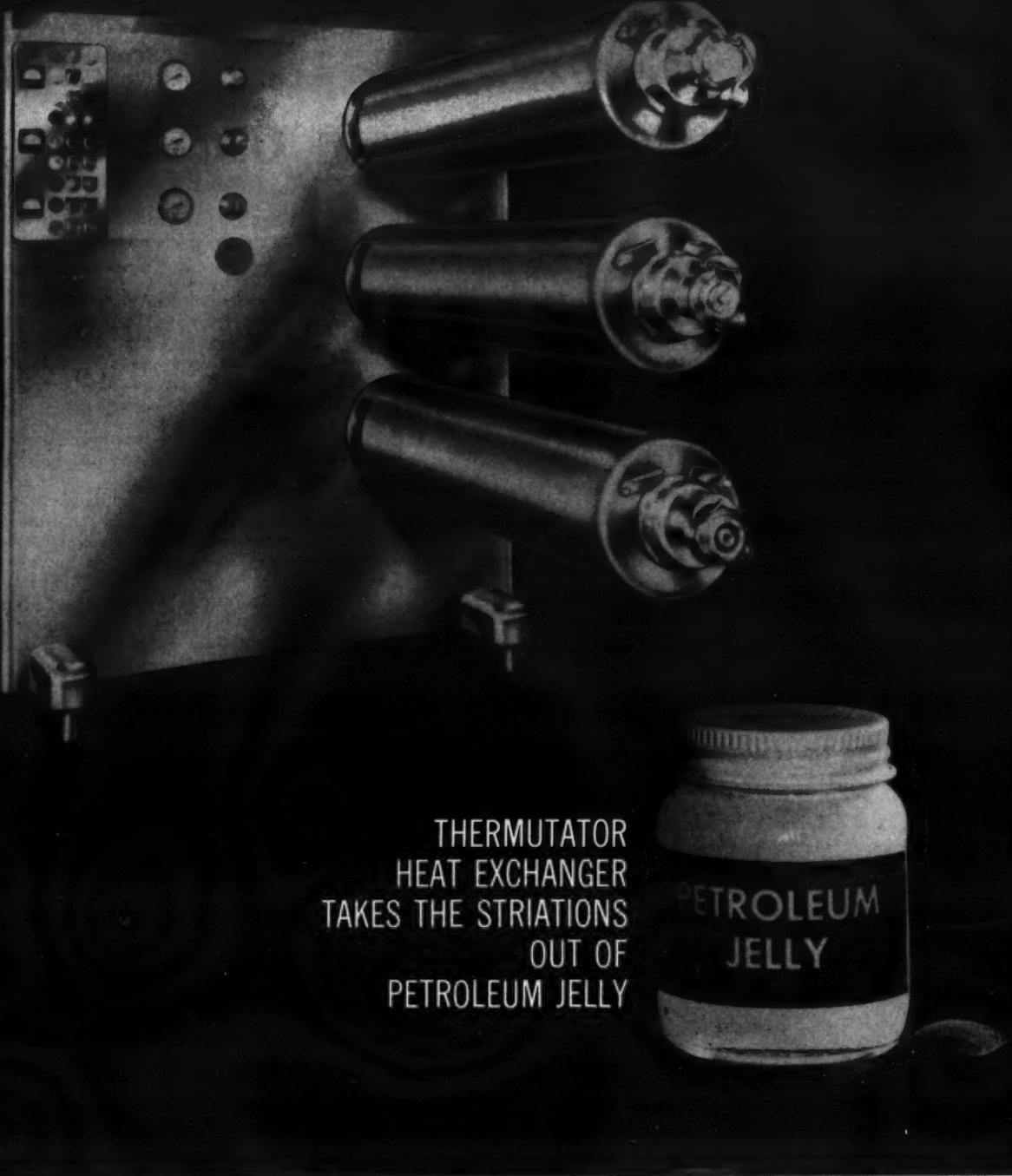
Dupont's tetra-fluoroethylene resin is finding a rapidly rising use in bakeries as stick-proof coating on dough rolls, dough scrapers, guide rails and other equipment.

Use of the coating is being boomed by Abbott & Biddle of Philadelphia, developer of a low-cost method of coating and sheathing baking equipment with Teflon.

Drinks own
waste

Two obstacles to fulfillment of the man-in-space program may have been cleared by recent tests in which men have completed six-day tests in which one consumed his purified liquid metabolic waste and another group breathed their own purified oxygen.

For more information on product at right, specify 2465 see information request blank opposite last page.



THERMUTATOR
HEAT EXCHANGER
TAKES THE STRIATIONS
OUT OF
PETROLEUM JELLY

Cherry-Burrell Cures Those Jelly Row Blues

Product appearance can make or miff a sale as a large manufacturer of petroleum jelly discovered. His product lay in unappealing rows or layers of different textured jelly. He asked Cherry-Burrell if they could give his product more of a *togetherness* look, solve his Jelly Row Blues.

After studying his manufacturing process and running laboratory tests on the product, Cherry-Burrell engineers found the trouble. The manufacturer's previous equipment cooled too slowly and produced striations in the jar.

The engineers recommended a Cherry-Burrell Thermutator. Now the manufacturer has complete control over product temperature. And the Thermutator blades texture the product, give it a smooth, uniform appearance. Sales picked up. And now the manufacturer whistles a happy tune. Why not? His petroleum jelly is a popular first choice everywhere.

Highly trained technicians will test your product without obligation in a Cherry-Burrell laboratory. They will show you how Cherry-Burrell

food processing equipment can help you improve your operation and profit position. Your specialists are invited to participate in the testing. Call or write Cherry-Burrell today.

*Case history on request.

Equipment for homogenizing, heating, cooling, flavorizing, storing, separating, freezing, mixing, packaging and conveying. Write for your free catalog.

C **CHERRY-BURRELL**
CORPORATION
CEDAR RAPIDS, IOWA



NOW AVAILABLE

NEW LOW PRICED

P-K PAUL CONTROL VALVES

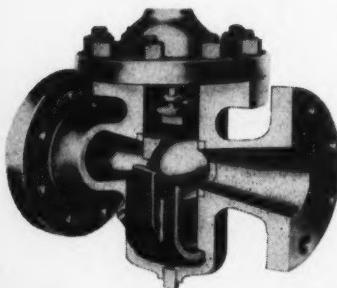
The new Series G
is priced competitively
with conventional control valves.

The same unique design that made the P-K Paul Venturi Control Valve the most efficient throttling control valve ever devised for critical applications has been incorporated into the new Series G line of P-K Paul Control Valves.



IN ADDITION TO LOWER COST

You Get:



- Higher Flow Capacity
- Rangeability Over 100 to 1
- Positive Shut-Off
- Non-Turbulent Flow
- Low Operating Thrust
- Self-Purging Action
- Resistance to Erosion and Abrasion

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Check 2466 opposite last page.

PROCESS INSTRUMENTATION and LABORATORY APPARATUS

Outdoor tank breathes dry

If moisture is unwanted inside an outdoor storage tank, then venting the tank to allow it to breathe is not an easy task. Faced with just such a difficulty, The Trubek Laboratories devised a clever, relatively simple control system which automatically maintains the right volume of dry air in a storage tank of an organic acid chloride.

A
NEW SOLUTIONS
FEATURE

Problem: Conventional direct venting of outdoor storage tanks containing a highly corrosive organic acid chloride admitted moist air which hiked free-acid value to an undesirable level at The Trubek Laboratories, Incorporated in East Rutherford, New Jersey.

Solution: A control system was installed which automatically maintains the required amount of dry air in one 2500-gal storage tank (in lieu of the several smaller ones previously used.)

When tank-contents volume is reduced—due to emptying of contents or ambient-temperature drop—pneumatic proportional pressure controller at top of tank (set at $\frac{1}{2}$ psi) actuates pneumatic control valve on 15-psi dry-air line to tank. (Air is dried

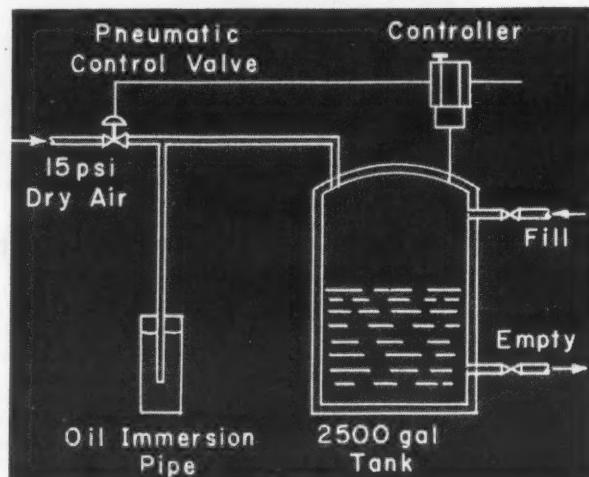
through desiccant bed.)

If tank-contents volume increases, valve closes, and dry air is forced through a $\frac{1}{2}$ " pipe outlet located between valve and tank. Air outlet is through a two-inch oil-immersion dip pipe in which depth is set for pressure of one psi.

Results: Control system has been successful in allowing organic-acid-chloride storage tank to freely vent, and at same time maintaining dry atmosphere within tank. In this manner free-acid value of tank contents has been kept at a minimum level.

(P097A pressure controller used here is product of Apparatus Controls Division, Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.)

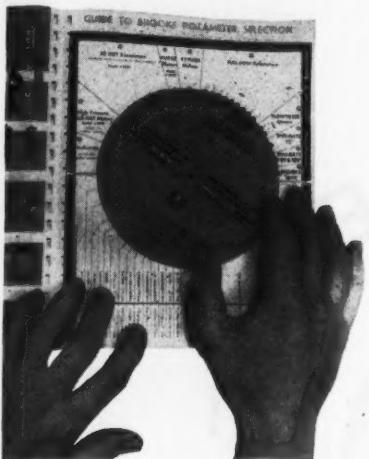
Check 2467 opposite last page.



This control system at Trubek Laboratories lets outdoor storage tank vent freely, while keeping contents dry. Pneumatic controller opens valve in response to pressure drop to admit dry air. On pressure rise, tank breathes out oil-immersed pipe

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HANDY SELECTION GUIDE GIVES ROTAMETER SPECIFICATIONS WITH JUST A TURN OF A DIAL



**It's yours for the asking
... from Brooks**

Here is a quick, convenient way to compare rotameter specifications to find the correct model for any particular application.

With the Brooks Rotameter Selection Guide, you can determine essential information at a glance. You simply set the chart dial at the required flow range, and other pertinent data—model, size, maximum operating temperature and pressure—are conveniently presented.

The Guide covers the full line of Brooks Rotameters . . . a line that includes everything from rugged armored meters for large flows, high temperatures and pressures, to "miniature" purge meters for small flow indication.

All in all, you'll find the Selection Guide a genuinely useful reference manual. To get a copy, request Bulletin 110.



BROOKS
INSTRUMENT COMPANY, INC.
5502 W. VINE STREET
HATFIELD • PENNSYLVANIA

Check 2468 opposite last page.

FEBRUARY 1961

No zero, span checks
needed to calibrate
 O_2 analyzer

Uses: Continuous analysis of trace quantities of uncombined oxygen.

Features: Instrument is based on technique which gives quantitative reduction of oxygen. This makes Faraday's Law directly applicable over full-scale range of instrument. Thus, need for zero and span calibration checks are not necessary (although they are included in instrument).

Description: Analyzer is based on simple coulometric process. Oxygen in sample stream is quantitatively reduced. Electrolysis current measured indicates original sample content. No current flows if oxygen is not present so there is negligible background correction, even for full-scale sensitivities of less than five ppm.

Quantitative operation is achieved in accordance with Faraday's Law, by design of cathode at which reduction takes place. Electrode is made of porous silver. Sample is passed through it so that oxygen reduction occurs within pores.

Porous electrode, in addition to providing sensitivity of 26.3 microamperes/ppm at flow rate of 100 cc/min, provides secondary benefit: It results in violent agitation of electrolyte. This makes externally applied agitation relatively negligible in effect. Also, high sensitivity of oxygen per unit area reduces, relatively, contribution of possible reducible impurities in electrolyte to background current.

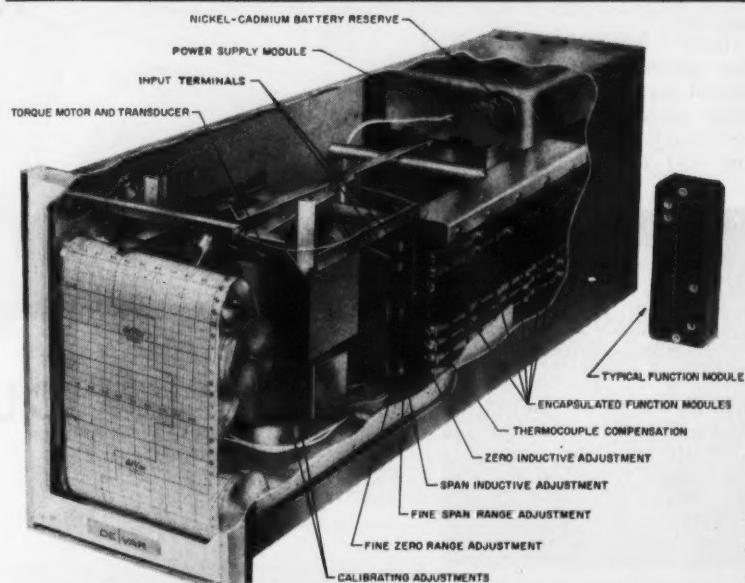
Adjustable full-scale range is 10- to 1000-ppm by volume. It may be extended upward to 1% and downward to five or one ppm, full-scale. Overall error of less than 5% of indicated oxygen or 0.1 ppm (whichever is higher) can be achieved.

(Oxygen analyzer O-1000 is product of Lockwood & McLorie, Inc. Box 113 Hatboro, Pa.)

Check 2469 opposite last page.



NEW MINIATURE 3 PEN RECORDER



- Input may be DC input from 0 to 1000 mV.
 - Receiver Recorder handles signals from 1V or 100 mV.
 - Solid state circuitry throughout—including unique transmission channel.
 - Battery reserve eliminates costly down time.
 - Unique input and range adjustment—continuously variable.
 - Encapsulated function modules.
 - High torque pen drive motor—fast response without overshoot.
 - Fine scale rectilinear writing with 1, 2, or 3 pens.
- The high performance characteristics of this recorder are unmatched by any other miniature recorder. In fact, some of the novel design features (e.g. DC input isolation and noise-free DC output signal) claim advantages found only in the most expensive full-size self-balancing potentiometric recorders. The DE VAR Recorder represents the ultimate in convenience, reliability, and stability of operation.

DE | VAR
SYSTEMS INC.

494 GLENBROOK ROAD
GLENBROOK, CONNECTICUT
DA-4-1105

Check 2470 opposite last page.

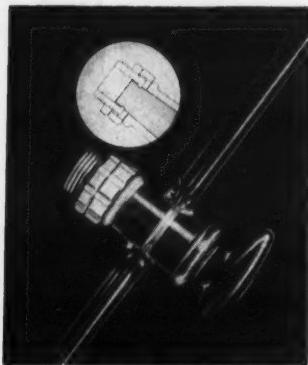
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**Stopcocks locked tight;
also may rotate**

Neither springs nor clamps
are utilized

A stopcock lock without
springs or clamps provides
positive locking action and at
same time permits freedom of
rotation.

Lock is fabricated from Teflon
and Marlex 50. It is de-
signed for use with standard
taper glass stopcocks. Device
withstands complete autoclav-
ing and may be used with



Stopcock lock withstands com-
plete autoclaving and can be
used with virtually all laboratory
reagents

burets, separatory funnels,
mercury-fill equipment, and
gas-analysis equipment . . . in
addition to converting stand-
ard taper glass stopcock to
pressure applications. Stop-
cock lock is available in five
sizes.

(Stopcock lock is product
of Glass Products Division,
Fischer & Porter Co., 702
Jacksonville Rd., Warminster,
Pennsylvania.)

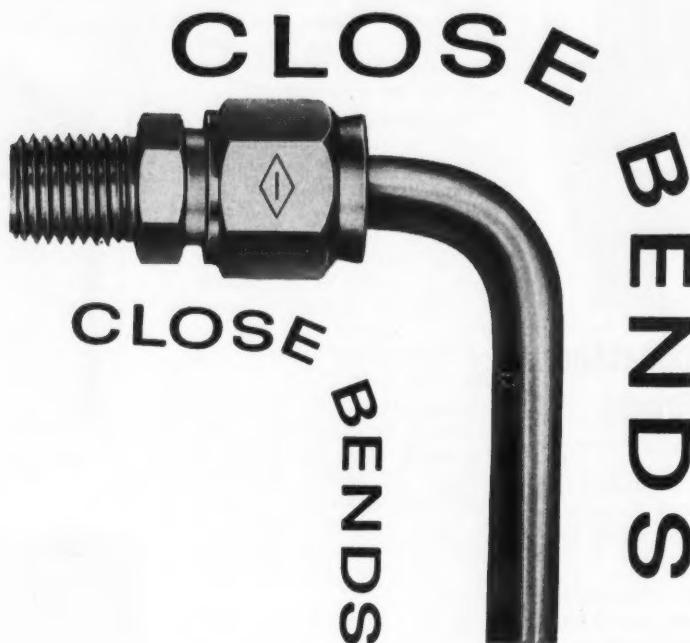
Check 2471 opposite last page.

Silica sought on-stream by colorimeter

Uses: Analysis of boiled wa-
ter, condensate and effluents
from demineralizers, water
softeners, and waste-disposal
plants.

Features: Analyzer provides
continuous on-stream analysis
of water. In 0- to 300-ppb
silica range, it permits detec-

no
problems
with...



With Hi-Seal® fittings you can make tube bends close to the fitting—in fact, right next to it. Here Hi-Seal is in a class by itself.

Hi-Seal's simplified design with flareless butt joint makes this possible. The advantages? More compact lay-
outs. Save on tubing. Shorten installation time by as
much as 50%. Gain utmost reliability. **SAVE MONEY.** To
get these advantages, insist on Hi-Seal.

For complete information, write for Bulletin 3108.



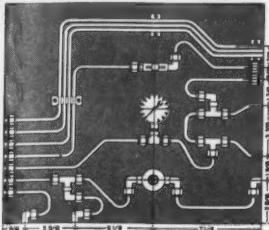
BUTT JOINT HI-SEAL

IMPERIAL  **EASTMAN**
Imperial-Eastman Corporation General Offices: 6300 West Howard Street, Chicago 48, Illinois

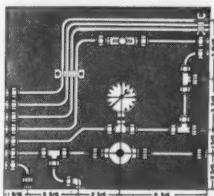
In Canada: Imperial-Eastman Corporation (Canada) Ltd., Toronto

Close Bends with Hi-Seal Save Time, Space, Tubing

Look at what you can do when you use
Hi-Seal fittings:



This typical layout has "old-fashioned" tube fittings. Layout area, 257 sq. in.; 12.7 ft. of tubing; installation time 2 hr., 34 min.



Same layout with Hi-Seal tube fittings. Layout area reduced 32% to 175 sq. in.; tubing reduced 40% to 7.7 ft.; installation time reduced nearly 50% to 1 hr., 20 min.!

All this is possible because of Hi-Seal's exclusive flareless, butt joint design. This means that tube bends may be made right next to the fittings. Even direct tube connections may be made without any extra loops to allow for tube entry into the fitting.

One Fitting for the Entire System

However varied your requirements may be, Hi-Seal meets them. Available in all styles, sizes and combinations, plus a variety of metals: steel, stainless steel, brass, aluminum, titanium, Monel, etc.

Now Imperial-Eastman meets all your requirements for hydraulic-pneumatic-flow system components: tube fittings, valves, couplings, flexible and rigid hydraulic and pneumatic hose, thermoplastic tubing, tubing tools.

FITTINGS

**IMPERIAL -
EASTMAN**

Check 2472 opposite last page.

FEBRUARY 1961

INSTRUMENTS & LAB

tion of concentrations of as low as five ppb with \pm two-ppb accuracy.

Description: Analyzer duplicates continuously and automatically principles of colorimetric analysis. When silica is present, sample turns blue. Intensity of color is measured and recorded. If desired, recorder operates upper-limit switch which actuates alarm.

Mechanical timer shuts-down pump and initiates flushing cycle at six-hour intervals. Analyzer is adaptable to transmit either electronic or pneumatic signals. It also can be set-up to conduct either single- or multi-point analyses.

(Chemonitor is product of Water Chemicals Division, Hagan Chemicals & Controls, Inc., Hagan Center, Pittsburgh 30, Pennsylvania.)

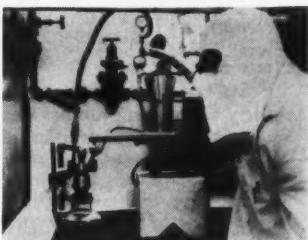
Check 2473 opposite last page.

A NEW SOLUTIONS ARTICLE

Steroids are fine-ground to less than 40 μ

A two-inch stainless-steel laboratory fluid-energy mill is fine-grinding steroids to less than 40 microns for the Squibb Institute for Medical Research, New Brunswick, N.J.

The mill is delivering 60 to 86% fines in 0- to 20-micron range. Remainder is in 20- to 40-micron range. Laboratory



Laboratory jet mill delivers 60 to 86% fines in 0- to 20-micron range and remainder in 20- to 40-micron range

unit handles small quantities of hormones, grinding them to sizes which permit their use as injectables.

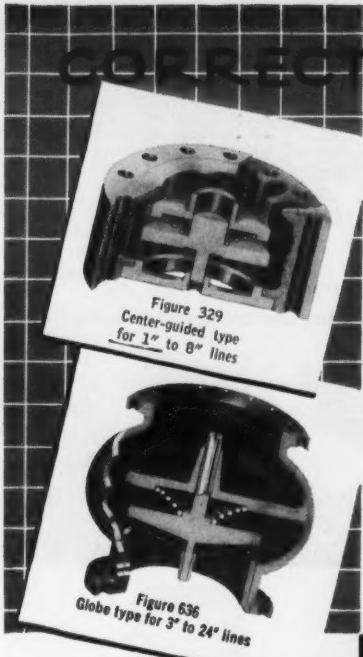
(Micronizer is product of Sturtevant Mill Company, Dorchester, Boston, Mass.)

Check 2474 opposite last page.

DESIGN ...

FOR SURE SURGE-PRESSURE PROTECTION

By closing instantly whenever flow reversal starts, or when flow is zero — these valves assure protection for piping, pumps and other components. Silent in operation, built of material to meet any service, usable in any position. Write for Bulletins: No. 654 on Valves; No. 851 on Cause, Effect and Control of Water Hammer.



The Williams Gauge Co., Inc.

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2 Gateway Center • Pittsburgh 22, Pa.
Our 75th Year • 1886-1961

Williams-Hager

**Silent
CHECK VALVES**

Check 2475 opposite last page.

*Where control depends
on measurement!*

**CON-O-PAK
THERMOCOUPLES**

FROM -300°F
TO 4000° PLUS

The world's finest thermocouples. New process increases precision and temperature range. Exceeds all military and commercial specs. Con-O-Pak is used in aircraft, missiles, nucleonics, chemical processing. Useful data? . . . Ask for "The Con-O-Pak Story."

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Check 2476 opposite last page.



Doré Vee rings have special satin finish . . . further increasing the extremely low coefficient of friction of Teflon.



Doré cup and cone packing of Teflon is ideal for reciprocating motion—seals without binding.



Doré "U" cups made to close tolerances from virgin Teflon have uniform density.

What's your seal problem? Check with Doré for a solution with seals of Teflon* or Fluorogreen

Our engineering, research and development departments have solved seal problems for valves, shafts, piston rods and scores of other applications where improved sealing is essential to higher efficiency and longer life of equipment.

Our seals, either standard or special, are produced under the most precise and rigid quality controls with many exclusive and special operations to assure maximum physical performance and dimensional accuracy.

Vee packing, bellows, seals, "O" rings, gaskets, cup and cone packing, "U" cups and scores of other styles and shapes are available from Doré to solve your seal problem. In addition, our engineering, research and development departments are ready to work with you in the solution of special problems with Teflon, Fluorogreen or a special compound. For detailed information write for Bulletin M-58.

*Registered trademark for Du Pont Fluorocarbon resins

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TEFLON
Doré
FLUOROGREEN®

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L. Doré Co. Reg.
Trademark

Check 2477 opposite last page.

INSTRUMENTS & LAB

Pigment-slurry solids
analyzed to $\pm 0.3\%$
in under 2 min

Uses: Determination of
solids and aqueous pigment
slurries.

Features: Solids analysis of
pigment slurry to $\pm 0.3\%$ ac-
curacy may be obtained in
less than two minutes.

Description: Analyzer util-
izes radio-frequency spectro-
scopy. Analysis is non-destructive. Instrument is applicable to paper, water-based paints,
inks, starch or cereal solutions,
colloidal-clay sus-
pensions and many other aqueous
systems.

(Solids analyzer is product of
Ridgefield Instrument Group,
Schlumberger Corporation,
Ridgefield, Conn.)

Check 2478 opposite last page.

For more information on develop-
ments reported in this section,
check corresponding numbers on
Reader Service Slip opposite last
page of this issue.

Reactions and distillations automatically programmed

Packaged monitoring system
handles many variations

Uses: Automating, pro-
gramming, monitoring and
controlling reactions and dis-
tillations.

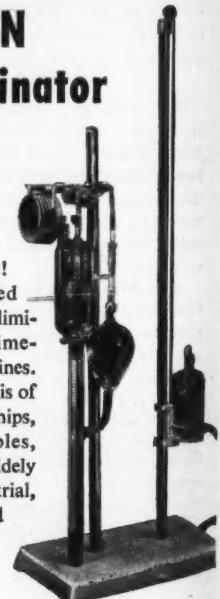
Features: Monitor has ver-
satility permitting almost end-
less variations in circuitry to
fit individual programs needed
for chemical reactions and
distillations.

Description: Typical uses of
instrument include 1) moni-
toring and automating frac-
tional distillations, 2) heating
reacting mixture, adding rea-
gent between set limits, and
raising reacting mixture to
higher thermostatted temper-
ature to complete reaction, 3)
cooling reacting mixture, add-
ing reagent between set tem-
perature limits, then allowing
temperature to rise to any
new preset point, and 4) re-
fluxing reacting mixture for



CARBON determinator No. 3003

Determine car-
bon content in
just 2 minutes!
No complicated
mathematics; elimi-
nates costly time-
consuming routines.
Accurate analysis of
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trates both Carbon and Sulphur Determinators
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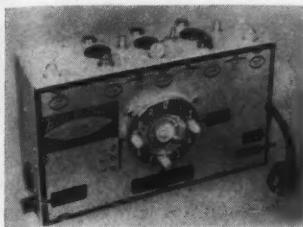
Check 2479 opposite last page.

CHEMICAL PROCESSING

INSTRUMENTS & LAB

requisite period, distilling-off solvent, and then turning-off.

Packaged unit is 12" wide x 4" deep x 7" high, with separate power and control circuits. Completion of power



Monitor permits almost endless variations in circuitry to fit individual programs needed for chemical reactions and distillation

circuit requires completion of control circuit. All components fit and lock together in plug-in manner.

(Burd-Watcher II is product of Scientific Glass Apparatus Co., Inc., Bloomfield, N. J.)

Check 2480 opposite last page.

Select, set, read — for corrosion measurement

Either laboratory or in-field operation is suitable for a corrosion meter which is now available. Meter weighs 11-lb. Outside dimensions of instrument's anodized-aluminum case are 12 x 10 x 5 1/4".

Operation is in three steps: 1) select probe, 2) set voltage, 3) null and read. Other features include built-in standard probe for quick meter check, integral reel-stored probe cable, double-gasketed protection of precision-built electronics, standard mercury battery power supply, and integral battery test circuit. Six models of probes are available for both industrial and laboratory use.

(CK-2 Corrosometer is product of Crest Instruments, 11808 S. Bloomfield Rd., Santa Fe Springs, Calif.)

Check 2482 opposite last page.

Solids density & porosity determined in one minute

Uses: Volume measurements for density and porosity determination of irregular, powdered and porous solids.

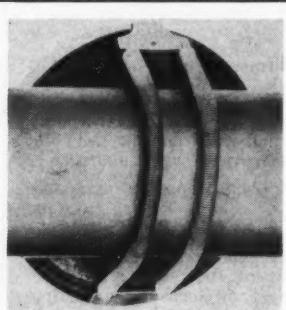
Features: Complete measurement may be made by unskilled operator in one minute without wetting or damaging sample.

Description: Air-comparison pycnometer has accuracy of ± 0.1 cc. Sample-container volume is 50 cc. Pycnometer is hand-operated and measures volume mechanically in terms of position of a piston related to its displacement. Direct digital readout in tenths off cc is provided.

Calibration may be checked by using sample volumes supplied. If required, calibration or zero error may be corrected in field.

(Air-comparison pycnometer 930 is product of Scientific and Process Instruments Division, Beckman Instruments, Inc., 2500 Fullerton Rd., Fullerton, Calif.)

Check 2481 opposite last page.



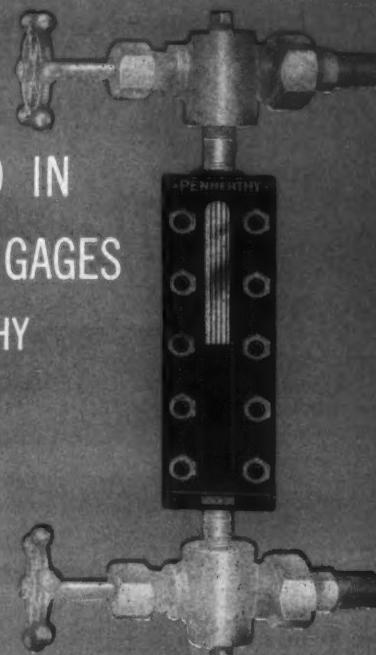
Clip-on thermometer

... is fastened on pipe by means of twin spiral-spring clips. Thermometers can be attached or removed from pipes in seconds. They can be used for all pipe to 3 1/2" in diam. The 2 1/2"-diam dials are silvered, with black figures and polished-chrome casings. Thermometers are graduated in 2° divisions. Models for two temperature ranges are available: 32 to 320°F (460) and -14 to +134°F (461).

(Pipe-fitting thermometers AP-FT 460 and 461 are products of Abrax Instruments Corporation, 179-15 Jamaica Ave., Jamaica 32, N. Y.)

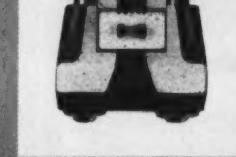
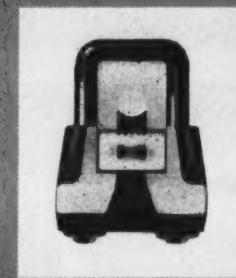
Check 2483 opp. last page.

ACCURACY



UNMATCHED IN LIQUID LEVEL GAGES

BY PENBERTHY



Certainly, your *first* requirement of a gage for determining liquid levels in tanks, pressure vessels, boilers, evaporators and other fluid containers is *Accuracy*. The design, materials and craftsmanship incorporated in the construction of Penberthy liquid level gage sets *guarantee* you clearer visibility, unmatched accuracy . . . at temperatures from sub-zero to 750°F. And Penberthy stands behind that statement with a 74-year reputation for unquestioned leadership in gage development and manufacturing.

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Check 2484 opposite last page.

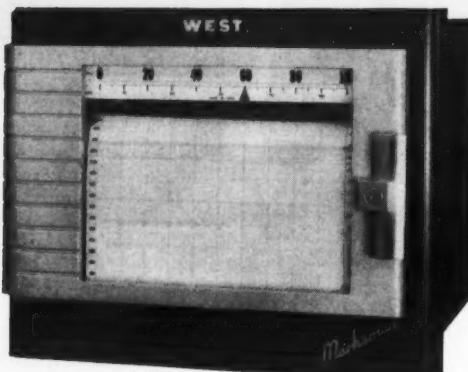
Still hitched to horse-and-buggy recorders?



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assure quality...
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Transistorized, these precise instruments avoid *all* the notorious tube-troubles. Needing no warm-up, adjustment, replacement of tubes or repair of their circuitry, Marksman recorders permit immediate and *continuous* operation...so increase production.

Accurate within 1/5th of 1%, they also include several special features which provide for more user-convenience and consistent quality-control. Users in many lines report Marksman recorders involve less operational cost, as well as reducing waste of other factors.

Let our world-wide service help on your own job. Phone your West consultant (see Yellow pages) or write Chicago office for Bulletin M.



the trend is to WEST



Check 2485 opposite last page.

NEW LITERATURE

Process Instrumentation
and Laboratory Apparatus

Continuous on-stream composition analysis of density, specific gravity, % solids, concentration or related quantity, by means of radiation, is subject of 12-page Bul CA-860—Industrial Nucleonics Corporation.

Check 2486 opposite last page.

High-vacuum gages are treated in 32-page bulletin covering absolute manometers, thermal gages, ionization gages, combination thermal-ionization gages, magamp controllers and sensing tubes. Extensive descriptions of each item in these lines are included in Bul 9-1—Consolidated Vacuum Corporation.

Check 2487 opposite last page.

Direct-reading dosimeters, pocket chambers, Roentgen meters, chargers and electrometers are topics of Cat G-13A—William B. Johnson & Associates, Inc.

Check 2488 opposite last page.

Automatic metering of desizing chemicals is subject of data sheet which describes how South Carolina mill effected substantial savings with automatic chemical-feed system to desize grey goods. Data Sheet J-59-1—Milton Roy Company.

Check 2489 opposite last page.

Gas-chromatography metal tube is expanded-upon in eight-page bulletin describing tube used for three types of columns: standard-capillary, miniature and packed. Bul 110—Superior Tube Company.

Check 2490 opposite last page.

Fume-hood line is delineated in 52-page catalog also covering service fixtures, accessories and electrical and mechanical fittings. Special sections are also devoted to dry boxes, blowers, duct work, and table-top and hood-lining materials. Cat. FH-6 — Metalab Equipment Company.

Check 2491 opposite last page.

Flowmeter uses vortex-velocity principle for measuring liquids and gases. It can be combined with densitometer or other instruments to measure mass flow. Further details on unit are explained in four-page Instrument Data Sheet 10.3-9—Industrial Division, Minneapolis-Honeywell Regulator Company.

Check 2492 opposite last page.

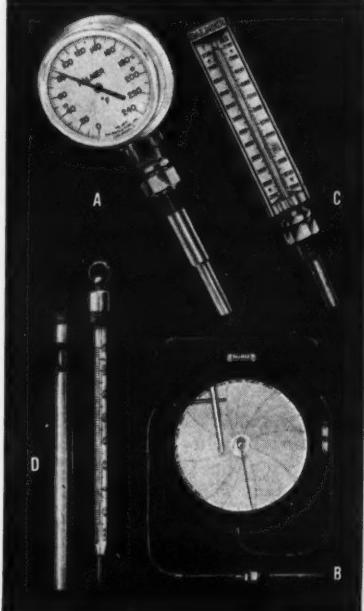
Flowmeter designed for low flow rates of liquids or gases is specified on single-sheet Cat 10A4135—Fischer & Porter Co.

Check 2493 opposite last page.

A GREAT NAME IN THERMOMETERS

PALMER

Mercury Actuated
Temperature Indicating Instruments



A—4½" DIAL THERMOMETERS: Made in 3 types to suit any requirements. Rigid stem, wall or flush mounted, 11 inches of scale reading. Interchangeable with standard industrial separable sockets. Stem can be placed at any angle and case can be rotated to any readable position.

B—RECORDING THERMOMETERS: Twelve inch die-cast aluminum case with black finish. Single or multiple pen construction. Electric or spring wound clock, 24 hour or 7 Day Revolution. Flexible Armor and bulb of stainless steel. Ranges: -40 +950°F or Equivalent in °C.

C—INDUSTRIAL THERMOMETERS: Red-Reading Mercury—Extruded brass case—chrome finish. Ranges: -40 +950° or Equivalent in °C.

D—RED-READING MERCURY LABORATORY THERMOMETERS: Thoroughly annealed for permanent accuracy. Complete line A.S.T.M. and fractional division types.

FOR COMPLETE INFORMATION WRITE FOR CATALOG

PALMER

PALMER THERMOMETERS, INC.
Cincinnati 12, Ohio • MEIrose 1 1500.

Check 2494 opposite last page.

CHEMICAL PROCESSING

Spectrophotometer accessories come up for discussion in 14-page bulletin discussing accessories which adapt spectrophotometers to requirements of such analyses as flame photometry, fluorometry, reflectometry, spectroradiometry, colorimetry, solid-phase studies, reaction-rate studies and turbidity observations. Bul 738 — Scientific and Process Instruments Division, Beckman Instruments, Inc. Check 2495 opposite last page.

Laboratory-apparatus details on 900 items are contained in 316-page color-coded catalog. Book also covers physical properties of glasses used for laboratoryware as well as technical information on use of such glasses. Cat LG-2 — Corning Glass Works.

Check 2496 opposite last page.

Balances designed for small-capacity operations are delineated in single-sheet bulletin, including complete specifications and operating instructions. Bul 3414 — The Exact Weight Scale Company. Check 2497 opposite last page.

Quality of pulp stock is continuously determined and recorded by unit described in illustrated process application sheet. A list of instruments comprising the system is included. Application Sheet 4-1 — Bailey Meter Company.

Check 2498 opposite last page.

Level indication system at an asphalt plant, utilizing automated capacitance-actuated level indicators, is detailed in two-page application bulletin. Both manner of operation and method of installation are covered. Bulletin L-103 — Robertshaw-Fulton Controls Co.

Check 2499 opposite last page.

Determination of halogen, sulfur, phosphorous and other elements by the oxygen flask method applied to organic substances is feature of six-page periodical, "Facts & Methods" Vol 1 No. 2 — F & M Scientific Corporation.

Check 2500 opposite last page.

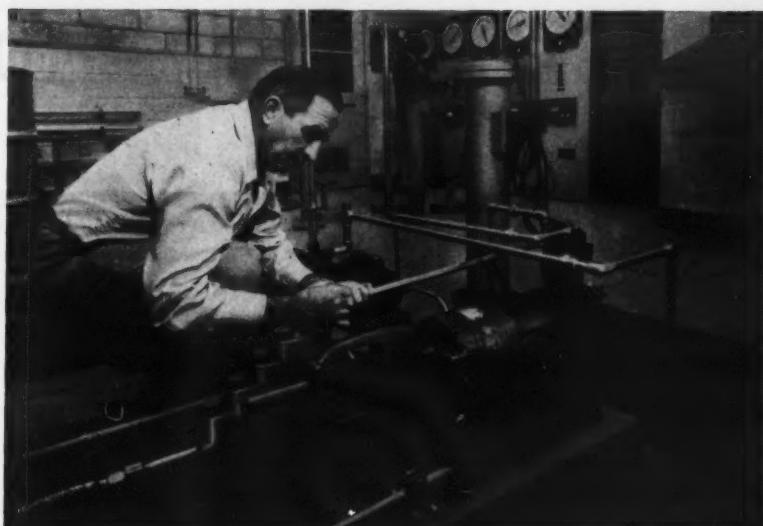
Barrel flow totalizer system bulletin gives complete specifications plus principles of operation and a block diagram. "Barrel Flow Totalizer System" — Potter Pacific Corporation.

Check 2501 opposite last page.

Determination of boron content of water, down to parts per million, is subject of two-page data sheet that includes a flow diagram and actual chart recordings. Bul B2 — Technicon Controls, Inc.

Check 2502 opposite last page.

how controlled volume pumps improve process control



In this waste treatment process, Milton Roy pumps automatically meter treatment chemicals in response to changes in pH.

When the variable is flow

An electronic pressure gage measures flow through a venturi tube installed in the main line. The resulting signal is fed through a null-balance circuit to a characterized square root potentiometer which regulates stroke length of a Milton Roy controlled volume pump. Phosphate feed accuracy is well within $\pm 3\%$ at all flow rates, and the system is so sensitive that feed rate changes as the flow rate changes with increasing or decreasing pressure on the main line reservoir pumps. There is no appreciable lag.

When the variable is temperature

In exothermic reactions where temperature varies with catalyst concentration Milton Roy pumps control catalyst feed in response to reactor temperature. A pneumatic temperature controller transmits a 3 to 15 psi control air signal to vary the stroke length of the controlled volume pump, accurately adjusting catalyst feed to process requirements.

When the variable is density

Final density of a casein solution sprayed on tobacco is controlled within narrow limits by an automatically controlled Milton Roy pump. A density sensing primary measures casein concentration in

the main stream and transmits a signal proportional to concentration to an electronic controller. With any deviation from the control point, the controller automatically varies pump stroking speed through a Thymotrol, thereby varying the flow of diluent.

When the variable is pH

In the alkaline-chlorination of cyanide wastes and the reduction of toxic chromium wastes, Milton Roy controlled volume pumps feed caustic solution to raise and maintain pH. The pumps are stroked by variable speed motors regulated by Thymotrol control units in response to electronic signals from industrial pH measuring systems.

Choosing the right pump for control

Accuracy must be designed into the liquid end. For example, ball checks must seat tightly at the exact instant the plunger changes direction, for 100% volumetric efficiency. To achieve the desired result, Milton Roy controls such interrelated factors as the height

of ball rise, relationship of seat to ball diameter, ball guide design, specific gravity of the ball, and acceleration of the process liquid as the plunger approaches its limits. Selecting the right combination for a particular pumping job and choosing the best control mechanism for the process are jobs for specialists.

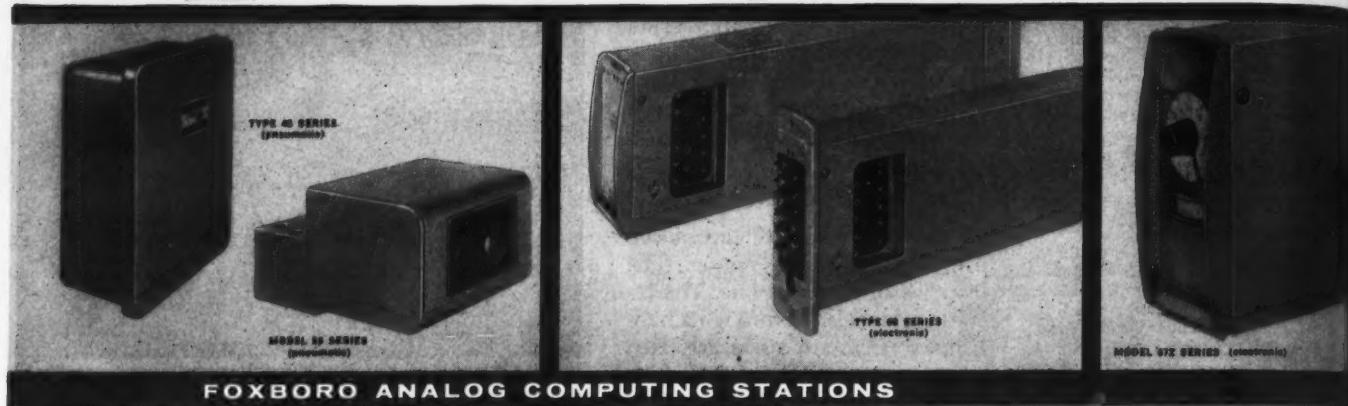
If accurate chemical feed to the process mainstream is one of your problems, look to Milton Roy's 25 years of experience for your most economical solution. Keep up-to-date on new control applications with a free subscription to "Engineering Briefs". Milton Roy Company, 1300 East Mermaid Lane, Phila. 18, Pa.



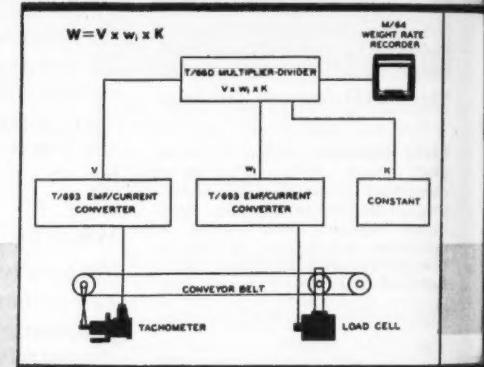
Controlled Volume Pumps • Quantichem Analyzers
Chemical Feed Systems • pH Instruments

Check 2503 opposite last page.

X² new low-cost Foxboro simplify automation

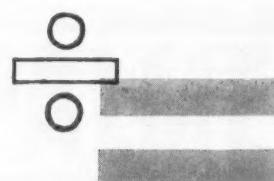


► TYPICAL



WEIGHT RATE COMPUTATION

Gives operator continuous recording of actual weight of materials being conveyed by belt. For example, T/66D Multiplier-Divider calculates actual weight-rate from load cell and belt speed measurements.



Analog Computing Systems of process mathematics

both pneumatic and electronic units available

Analog computing systems have been known and used for years. Yet their potential for increasing process efficiency has hardly been scratched.

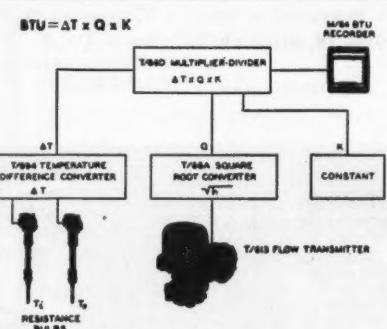
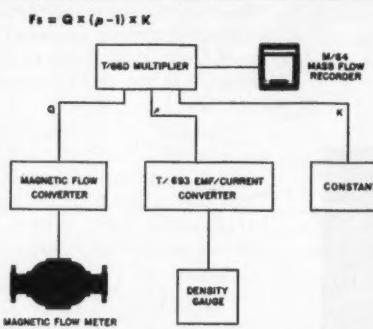
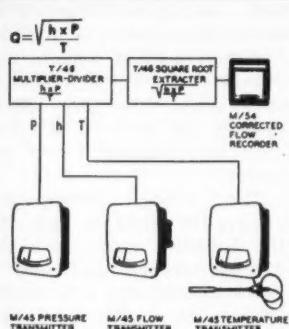
Just look what they can do! Continuous calculation of all the arithmetic functions: addition, subtraction, multiplication, division, square root extraction — in any combination. And all done automatically by a single packaged system.

And look how it simplifies the operator's job.

Instantaneous calculation . . . with records to prove it. No slide rules, no interpolation, no planimeters — and most important — no mistakes.

Because Foxboro Analog Computer Systems are relatively low-cost (\$2500-5000 average) you can "spot" them about your plant for maximum efficiency. Or, they can be grouped together at a central location to solve more complicated equations. Pneumatic and electronic systems available.

CALCULATIONS MADE WITH FOXBORO ANALOG COMPUTING SYSTEMS



GAS FLOW COMPUTATION

In common use in the Gas Industry to compensate gas flow readings for changes in line temperature and static pressure. In the pneumatic system shown here, the Foxboro T/46 Multiplier-Divider and the Square Root Extractor allow operator to read corrected flow directly.

MASS FLOW COMPUTATION

Calculates dry weight of a slurry flowing through a pipeline. In this electronic system, flow rate and density measurement are multiplied together with a Foxboro T/66D-1 Multiplier. Operator can then read flow directly in Dry-Tons-Per-Minute.

BTU COMPUTATION

Determines actual amount of heat being introduced to, or removed from, a process. Electronic system shown uses a Foxboro T/66D Multiplier-Divider to produce a signal equal to product of flow and temperature difference. Operator reads directly in Btu's.

WHAT CALCULATIONS WOULD
YOU LIKE TO AUTOMATE? →

The Foxboro Company, 812 Neponset Ave.
Foxboro, Mass.

I have a process computation I should like to automate. Can a Foxboro Analog Computing System do it for me?

My process is.....

I want to compute.....

Name.....

Position.....

Company.....

Address.....

City..... State.....

For
more information
on product at
left, specify 2504
see information
request blank
opposite last page.

FOXBORO
REG. U. S. PAT. OFF.



Centrifuge refunds itself annually

Does faster, neater job of clarifying 30 gpm linseed oil; savings add up to \$45,200 per year

TED F. MEINHOLD, Associate Editor
with **JOHN SHEPERD**, Plant Superintendent
Vegetable Oil Division Cargill, Incorporated

A
NEW SOLUTIONS
FEATURE

Problem: Removing fine particles from linseed oil was a slow, tedious and expensive operation at the Vegetable Oil Division of Cargill, Incorporated, Minneapolis, Minnesota. The two conventional batch-type filters used for the job were awkward to operate and devoured a total of \$2100 worth of filter cloth per month.

Cleaning the units was a

messy task and presented the plant with a sizeable housekeeping problem. Four men were needed to properly perform the cleaning operation.

The filtering step is part of the plant's overall flaxseed processing operations. Oil is initially extracted from the seed by a French expeller. Coarse particles are removed on a 3 x 8', 40 x 60-mesh vibrating screen before oil goes to filters.

Oil from screen is 130°F, contains from 0.5 to 0.9% fines and has viscosity of about 30 centipoises. Screen handles approximately 130 gpm, of which 100 is recirculated and used for cooling and cleaning expeller cages. Only 30 gpm continues for further clarification.

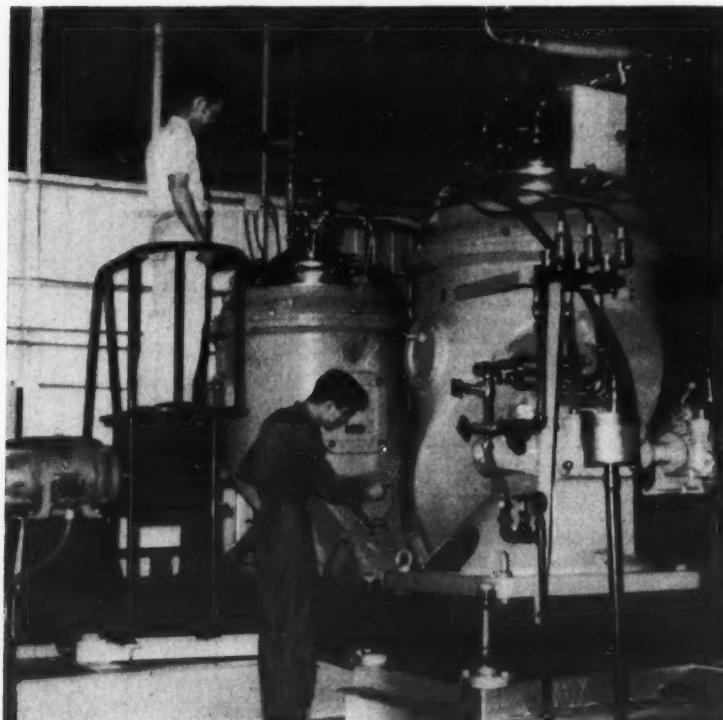
Solution: Filters were replaced by an automatic disc-type centrifuge that cleans itself while operating at full speed. This is accomplished by means of a hydraulic piston which periodically opens slots extending around periphery of bowl, so that accumulated sludge can be instantaneously ejected.

Operation of the machine is as follows: Slurry is fed into top of centrifuge by gravity. Feed then passes down through center tube and enters the disc stack. Product next circulates upward through aligned holes in the discs.

Discs function as conveyors along which solids and liquid move in opposite directions. As solids slide outward along undersides of discs, they agglomerate and concentrate as they move due to pressure against the discs. Clarified liquid is forced inward along upper surfaces of discs, and ultimately flows out top of the centrifuge.

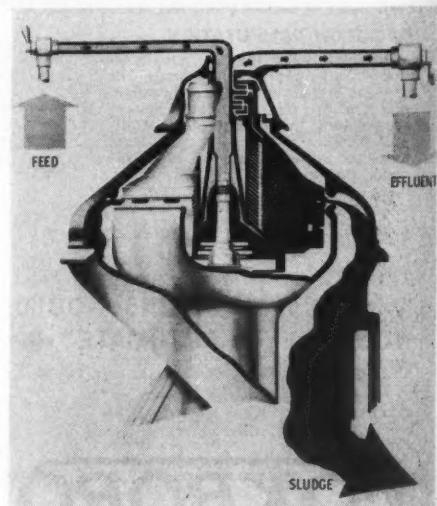
Sidewalls of machine are at 45° angle so that solids, under influence of centrifugal force (up to 7500 times gravity), slide readily to periphery of bowl. Large slots (3/8" high by 5" long) extend around approximately 75% of bowl. At any desired time, slots can be opened, and in tenth of a second, accumulated solids are ejected.

The actual opening and closing of slots is achieved by injecting water into two grooves around underside of bowl. This results in hydraulic



Centrifuge similar to these processes the linseed oil at Cargill. Units shown here are extracting pulp from fruit juice

Self-cleaning feature of centrifuge permits desludging to be performed automatically every 2½ minutes



pressures on a piston around outer part of bowl, causing piston to lower or raise. Water consumption is relatively low (about 45 gph on large units) since it is injected only to open or close the slots.

The centrifuge at Cargill, known as a Titan CNS-150 Superjector, is powered by a 30-hp motor and operates at 5000 rpm. Bowl capacity is 6.3 to 8.0 gal. The bowl weighs about 990 lb, has 24" diam. Overall space occupied by centrifuge is approximately 35 sq ft, which is considerably less than that required for the two filters. Unit weighs 6800 lb.

Results: The centrifuge clarifies the linseed oil quickly, neatly and at considerably less cost. Annual gross savings through use of the machine are estimated to be \$45,200 — which means that the unit easily pays for itself once every year. The annual savings are broken down as follows: Filter cloth — \$25,200; labor — \$24,000. (Men formerly required to clean the filters became available for other work.) Centrifuge operating cost is only \$4000 per year.

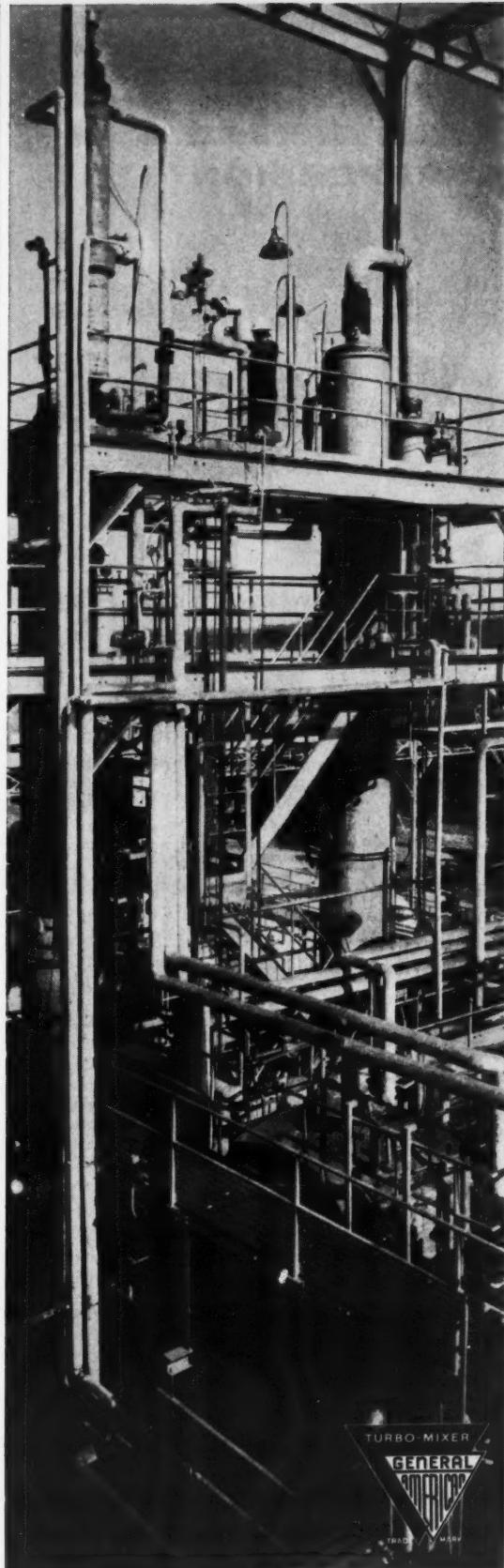
Product leaving unit contains from 0.1 to 0.2% fines. Although this is not quite as clear as former filtered oil, it is still ample for the process. Remaining fines are removed by a degumming step, which also had to be conducted previously. The small additional amount of fines do not interfere or lengthen the degumming cycle.

Flow through centrifuge averages 25 to 30 gpm. Sludge is automatically discharged every 2½ minutes, and amounts to about five gallons. Sludge is pumped back to Rotocell for reprocessing.

Approximately once every two weeks the centrifuge bowl is disassembled for cleaning, lubrication and inspection. However, the unit has operated as long as six weeks without shutdown. Using spare bowl, changeover can be made in about one hour. If only one bowl is used, the maintenance operations mentioned above consume more time.

The centrifuge has been operating for over two years.

To next page



TRY THIS SIMPLE QUIZ ABOUT THE RDC COLUMN

1. R.D.C. stands for

- a) Rapid Dispersion Column
- b) Recycle Displacement Column
- c) Rotating Disc Contactor

2. RDC Columns are made by

- a) 6 different manufacturers
- b) by one manufacturer
- c) by 10 manufacturers

3. The RDC column has been used for

- a) Separation of Hafnium from Zirconium
- b) Caustic extraction of acids from organics
- c) Caffeine and vanillin extraction

4. The RDC column can be used for

- a) liquid-liquid extraction
- b) liquid-solid extraction
- c) liquid-slurry extraction

5. The RDC column has which of these advantages

- a) High volumetric efficiency
- b) No interstage coalescing or external settling
- c) Low power requirements

Answers

1. (C) Rotating Disc Contactor.

2. (B) RDC columns are made for the process industries exclusively by General American, and on a non-exclusive basis for the petroleum industry.

3. (A), (B) and (C). For a complete list of typical systems in service, contact General American.

4. (A), (B) and (C) again. The RDC column is one of the most versatile tools available for extraction processing.

5. (We did it again—all three are correct).

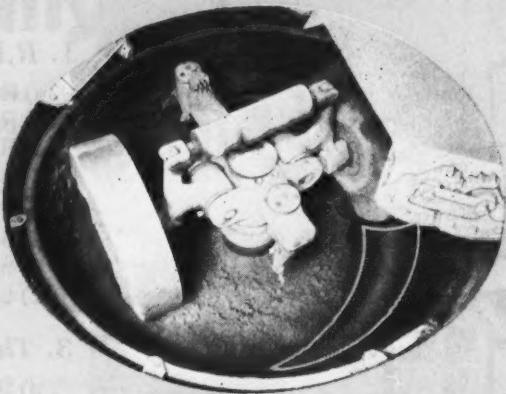
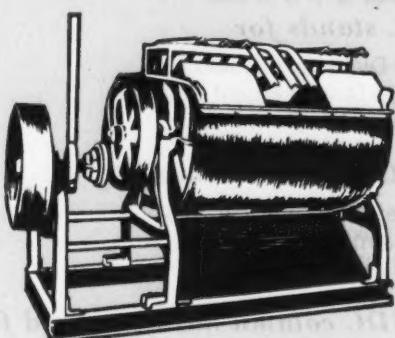
If you'd like more information on the RDC column and the many advantages it offers, send for Bulletin T-1159. You'll find it pays to plan with General American.

Process Equipment Division—Turbo-Mixers
GENERAL AMERICAN TRANSPORTATION CORPORATION
135 South LaSalle Street • Chicago 3, Illinois
Offices in principal cities

Check 2505 opposite last page.

MIX-MULLER

MEANS CONTROLLED DISPERSION



You can MIX without a muller; but can you MULL without mullers?

A study in semantics . . .

The muller is a very specialized piece of mixing equipment. It is specifically designed for use where an intensive, intimate blend of dry/solid, solid/solid, or wetted/solid materials is needed.

Trying to mull, or achieve controlled dispersion, in a machine not equipped with MULLER WHEELS is like flying a tailless kite on a windy day . . . you may get it off the ground, but you have no control.

The fact that you can control dispersion through the use of muller wheels is the reason why at least three manufacturers have specialized in this art for about half a century. Today, the need for controlled dispersion has become increasingly evident to processors as well as to mixer manufacturers . . . everybody's got a muller. So, if you need controlled

dispersion, it will pay you to remember that mulling is more than a matter of semantics. What was a mixer last year . . . is not necessarily a muller this year.

Simpson Mix-Muller Division has devoted a 12-page bulletin to the subject. It's called the HANDBOOK ON MULLING. Why not write for a copy? Or, see it in the current *Chemical Engineering Catalog*.

*Presented in the interests of maintaining truthful presentation of—
and purposeful application for,
the mulling principle of mixing by:*

SIMPSON MIX-MULLER DIVISION
NATIONAL ENGINEERING COMPANY
640 Machinery Hall Bldg. • Chicago, Illinois



P1360R

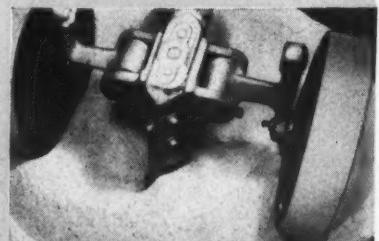
NOTHING MULLS LIKE A MULLER



GOING: Mix is wetted, dispersion of coating media begins as lumps begin to form.



GOING: Smearing, spatulate action breaks up lumps as mulling action disperses moisture.



GONE: Agglomerates almost gone as blending nears completion. Mix is homogeneous, thorough.

Check 2506 opposite last page.

Unit functions entirely automatically so there is no need for constant operator attention. Operator need only set timer and start equipment.

Initially there were some difficulties in learning how to operate the unit. The meal fines being separated are abrasive and caused wear on some of the liners and gaskets. Periodic inspection and replacement with tougher materials has helped solve this.

(Titan Superjector centrifuges were supplied by Pfaudler Division of Pfaudler Permutit Inc., Rochester 3, New York.) Check 2507 opposite last page.

Tests pay dividends — tell which homogenizer does best job

No specialized equipment needed to conduct them

Guesswork need no longer play a part in selecting the best homogenizer or colloid mill for your particular dispersion job. A potential purchaser can reach a sound decision by performing a few simple tests of his own. If product quality is important, the amount of additional time consumed by this procedure can pay fine dividends.

Machines of varying principles of operation and efficiency are on the market. Most equipment manufacturers have facilities to test samples to see if their machines can do the job and if so, the best operating conditions for it.

Get Samples Back

The customer should make it a point to have the samples illustrating the results for various conditions returned to him from all the manufacturers that he has submitted samples to.

The machine that did the best job can be quickly spotted by comparing viscosity and proportion of supernatant (as determined by settling rate on a centrifuge) of the best samples with that of an unhomogenized specimen.

Viscosity should be plotted

against the proportion of supernatant liquid present. Best dispersion, of course, occurs where former value is at a maximum and latter is minimum. Conventional laboratory apparatus and techniques can be used to perform the determinations.

Finds Best Conditions

Optimum effectiveness of dispersion in an existing machine can also be determined in this manner. Samples should be taken during a run under varying operating conditions. Evaluating these samples for viscosity and/or settling rate quickly establishes the best condition.

An effective way to control dispersion is by use of an automatic viscosity-measuring device in the process stream behind the homogenizer or colloid mill. By means of a controller and the adjusting mechanism on the machine; pressure, angular velocity, or clearance can be regulated, thus controlling degree of homogenization.

(Condensed from technical paper "Dispersion and Homogenization Evaluation and Measurement" prepared by D. E. Griffith, Eli Lilly and Company, Indianapolis, Ind.)

Tough spray nozzles resist abrasive, corrosive fluids

Uses: Spray drying abrasive or corrosive liquids with high solids content.

Features: Nozzles deliver uniform, hollow-cone, spray pattern and are capable of producing good atomizations at reduced pressures.

Description: Nozzle body is made of stainless steel. Tungsten carbide is used for critical areas of wear. Single inlet spiral configuration of chamber produces a natural, free vortex, flow pattern. Friction is minimized.

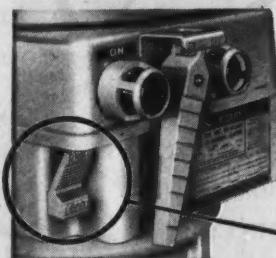
(SDX spray drying nozzles are product of Delavan Manufacturing Company, West Des Moines, Iowa.)

Check 2508 opposite last page.

SQUARE D SPIN TOP[®] ENCLOSURE NOW MORE VERSATILE THAN EVER!

DAMAGE-RESISTING Acme threads. If you've struggled with "banged-up" threads, you'll appreciate this feature. It's always a breeze to put on and take off tanks for installation, inspection or maintenance.

FULL WEATHER PROTECTION Male threads on collar engage female threads on tank—no external threads to be damaged.



NEW!

RECESSED CONTROL STATIONS

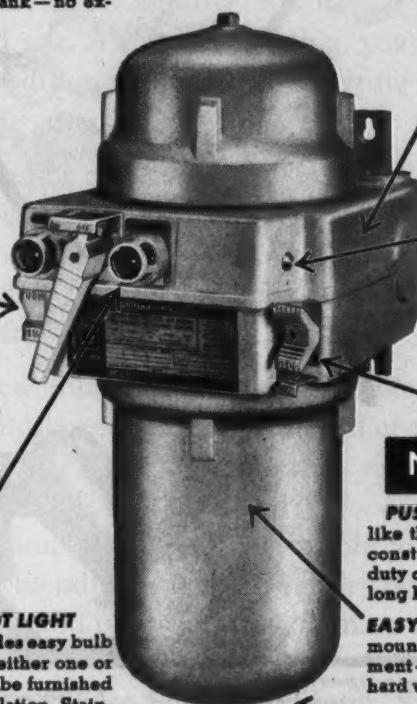
like the reset button are out of the way, have no protrusion to break or bend accidentally.



NEW!

BRILLIANT PILOT LIGHT

is visible from all angles and provides easy bulb change. Enclosure available with either one or two factory-mounted lights or can be furnished with plugged holes for field installation. Stainless steel thread-in-thread construction gives corrosion-resistance and easy servicing.



NEW!

CONTROL TRANSFORMER can be mounted in collar. No special-length tanks required.

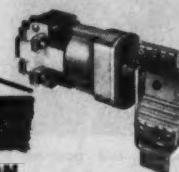


INCREASED WIRING SPACE Four conduit openings standard, with through-feed conduit entrances for horizontal tap-offs optional.



NEW!

SELECTOR SWITCH is made in one piece, installs simply by threading into opening provided in enclosure. One-piece construction permits pre-testing before shipment.



NEW!

PUSHBUTTON, like the selector switch, features one-piece construction for easy installation. Heavy-duty contacts and rugged mechanism assure long life.

EASY TO INSTALL with slide and hook mounting arrangement for interior equipment—a Square D "exclusive." Takes the hard work out of the installation job.

STRONG AND LIGHTWEIGHT construction.

Complete enclosure is cast aluminum. All operating shafts are stainless steel, thread-in-thread, for the best in corrosion resistance.

4 ENCLOSURE SIZES ACCOMMODATE NEMA SIZES 0 THROUGH 5

Square D Spin Top enclosures are NEMA 3 (weather-proof), NEMA 4 (watertight), NEMA 7 (explosion-proof) and NEMA 9 (hazardous locations) for Class I, Group C and D; and Class II, Groups E, F and G service.

Write for Bulletin 9990. Square D Company, 4041 North Richards Street, Milwaukee 12, Wisconsin

SQUARE D COMPANY

wherever electricity is distributed and controlled

Check 2509 opposite last page.

PROCESSING EQUIPMENT

**Glass reaction vessel
is electrically heated,
holds up to 20 gal**

Uses: Heating high-purity materials such as fine chemicals, pharmaceuticals or cosmetics.

Features: Pyrex-brand glass container can handle up to 20 gal. Unit is electrically heated.

Description: Batch reaction vessel is mounted on an aluminum trunnion frame. Tilting mechanism permits products to be quickly and easily emptied. Top bar on frame can also be used to mount stirring apparatus.

Aluminum-enclosed, electric heating mantle heats in zones to prevent super heating of



Tilting mechanism and pouring lip on unit permit contents to be easily emptied

vessel above liquid level. Containers are available in 10 or 20 gal sizes. Both sizes fit into same frame.

(Further information about electrically-heated, glass reaction vessel may be obtained from Glass-Cel Apparatus Company, 711 Hulman Street, Terre Haute, Indiana.)

Check 2510 opposite last page.

**Fine materials cooled
rapidly and efficiently
by drum cooler**

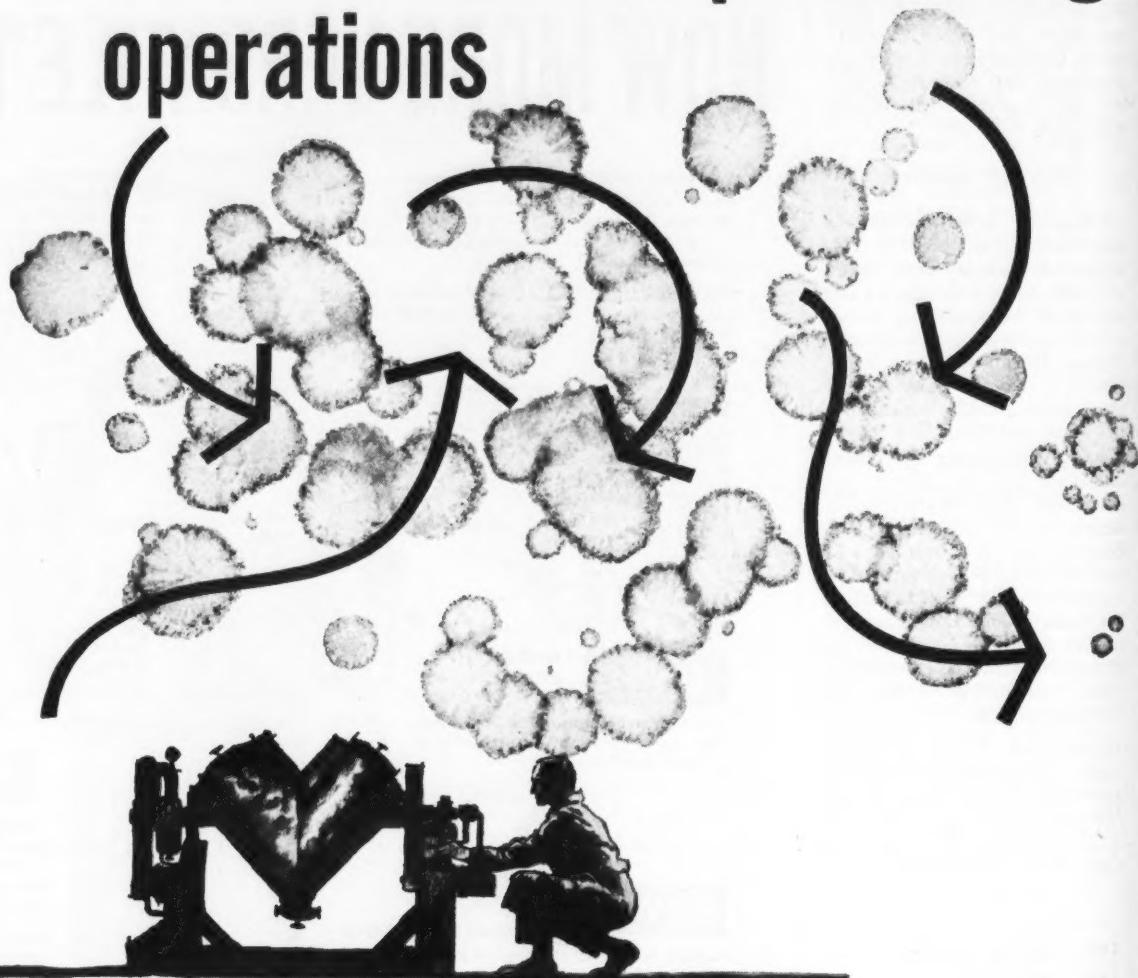
Heat transfer rates reach 20 Btu/(hr) (sq ft) ($^{\circ}$ F)

Uses: Cooling variety of materials in chemical and allied industries.

Features: Unit can handle finely-divided materials at high temperatures, cooling

new P-K solids-processor performs up to*

10 solids processing operations



*Patented and Patents Pending

1. Precision gentle blending
2. Intensive blending
3. Liquid-solids blending
4. Granulation of solids
5. Vacuum drying of solids
6. Coating of solids
7. Heat sterilization of solids
8. Gas sterilization of solids
9. Chemical reaction of solids
10. Heating or cooling of solids

(Many of these operations can be performed under vacuum)

The P-K Solids Processor gives you many exclusive opportunities for savings — in *quality control, equipment, time, manpower, space*. It not only combines vacuum drying and liquid-solids blending in one fully packaged unit for the first time, but it also performs in a simple sequence more operations in a single unit than ever before possible.

DRY BLENDING — With this latest P-K "Twin-Shell" development you can tumble solids to give gentle precision blending. This may be done under vacuum or atmospheric conditions, in inert or sterilizing gas, with heat in jacket up 200°F., or with cooling through jacketed shell. If required, intensifier bar action breaks up agglomerates or gives uniform dispersion of difficult materials such as pigments.

LIQUID DISPERSION, GRANULATING — You can disperse controlled amounts of liquid uniformly into solids. Fluids of any viscosity can be handled.

Dispersion can be sufficiently intimate to provide a lump-free powder. Or you can regulate it to produce granulations of controlled size. As in dry blending, you can conduct these steps under vacuum or atmospheric conditions, in inert or sterilizing gas, or with cooling or heating through jacketed shell.

VACUUM DRYING — You can use the P-K Solids-Processor to vacuum dry heat sensitive materials. A separately actuated agitator speeds drying to a finished fine powder or controlled granule. In final stages of drying, direct hot air or gas can be introduced.

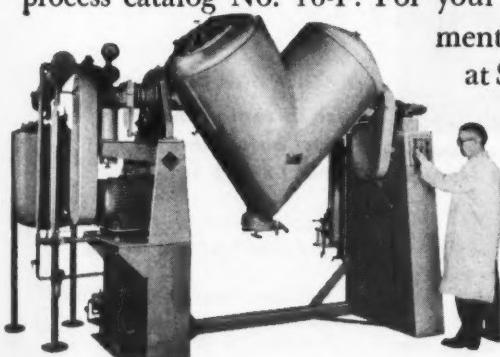
All P-K Solids-Processor systems are completely packaged. Available in standardized models with charge capacities from one to fifty cubic feet.

PRE-TEST SERVICES — A production model of the new Solids-Processor is available for pre-testing at our Pre-Test Laboratory in East Stroudsburg. Standard, intensifier and liquid-solids "Twin-Shell" Blenders are also available . . . as are packaged vacuum tumble dryers (conical type) and ribbon blenders.

Using your materials, P-K engineers can demonstrate things impossible to see without pilot study . . . work out subtle variables in blending, granulating, drying . . . indicate scale-up results and operational procedures . . . and predict savings in materials, labor, investment.

You'll gain the most by making the trip personally to East Stroudsburg. Your guidance will be helpful. If you cannot make the trip, send your materials.

All P-K equipment is completely described in P-K's new process catalog No. 16-P. For your copy or to make pre-test arrangements, write or phone George Sweitzer at Stroudsburg, Hamilton 1-7500.



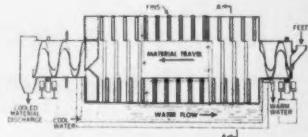
Patterson  **Kelley**

Chemical and Process Equipment Division
132 Burson Street, East Stroudsburg, Pa.

PROCESSING EQUIPMENT

them rapidly and efficiently. Overall heat transfer coefficients are as high as 20 Btu/(hr) (sq ft) (°F).

Description: Cooler consists of rotating drum equipped with series of flat, dual-pur-

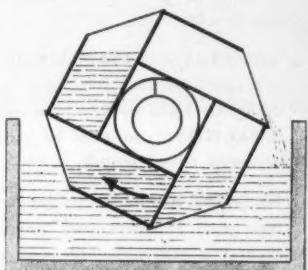


Drum of cooler contains dual-purpose fins lapped to form spiral around inside of shell

pose, hollow fins around inside of shell. Fins are welded in such a manner as to form a continuous spiral.

As drum revolves partly submerged in water, material to be cooled moves along spiral fin from one end to other. Openings on side of drum continuously scoop up and empty cooling water with each revolution of drum.

There are no fans, dust collectors or complicated controls needed. Unit is also safe for high temperature applica-



SECTION AA

Fins scoop up water with each revolution and discharge it back into tank. Material being cooled travels through drum

tions. Flashed steam is free to escape through large exhaust stacks.

First commercial installation of such a cooler was made over a year ago at gypsum plaster plant. Unit has since been in continuous service, cooling calcined gypsum plaster from 375° down to 150°F.

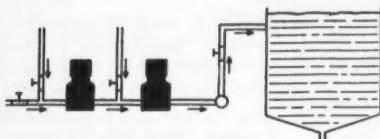
(Roto-Fin cooler is product of Link-Belt Company, Prudential Plaza, Chicago 1, Illinois.)

Check 2511 opposite last page.

NEW

SHEAR-FLOW CONTINUOUS MIXER

**Finer, faster blending
for in-line processing**



CUT PROCESSING COSTS: This compact and completely self-contained unit conserves space, eliminates large mixing and paddle tanks, speeds up pipe line processing, handles high viscosity material in a minimum of time and conveniently lends itself to systems requiring jacketed heating or cooling.

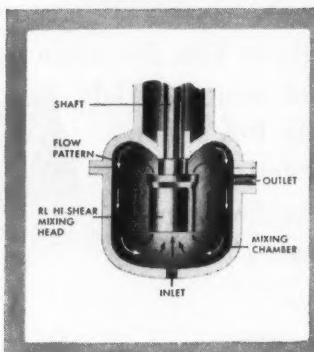
ELIMINATE COSTLY EQUIPMENT: Incorporating the same design principle as the portable SHEAR-FLOW, the new continuous mixer is capable of mixing any liquid that can be pumped, with results better than or comparable to that of equipment costing considerably more.

VERSATILE ADAPTABILITY: More than one unit can be installed in series or in tandem along the route of flow. The new continuous SHEAR-FLOW can also be mounted either vertically or horizontally.

HI-SHEAR HEAD: The unique Hi-Shear Head with dual impellers and stationary stators creates a high turbulence and concentrated shearing action that results in finer, faster blending, homogenizing, emulsifying or dispersing. Mechanical shear is achieved through close tolerances between impellers and stators.

SIZE RANGE: The new SHEAR-FLOW can be powered with motors ranging from 1 to 10 horsepower depending on the power requirement demanded by the application.

Write for free Bulletin No. RL-200



GABB SPECIAL PRODUCTS INC.

Windsor Locks, Conn.

Check 2512 opposite last page.

PROCESSING EQUIPMENT



Jumbo stainless column

... weighs 50 tons and measures 12' diam by 80' long. Valued at about \$200,000, unit also has stainless steel sieve trays. It will be used for purification of chemicals for manufacturing synthetic fibers. The giant tower's rectification section was made of Carpenter 20 high-alloy, stainless steel.

(Distillation column was fabricated by Colonial Iron Works Co., Cleveland 10, Ohio.)

Check 2513 opposite last page.

provides means of disposing the dusty paper bags.

The loading operation is located on the third floor of the building. Pigments are dumped from bags into chute and gravity-fed into process. Both dust and paper bags are drawn into duct-work leading to the cloth, tube-type collector.

Bags and air enter plenum chamber adjacent to collector. Bags strike baffle plate inside unit and fall to bottom of hopper where they are removed by large rotary valve. Dust-laden air continues into collector and is trapped by tubes of the unit.

Results: The dust collector is performing double-duty service. Design permits company to conveniently dispose



► A NEW SOLUTIONS ARTICLE
**Double-duty performed
by dust collector
in paint plant**

Gets rid of paper bags, keeps air free of dust

Problem: Considerable amount of dust was created during dry pigment loading operations at Rust-Oleum Corporation, Evanston, Illinois. Pigments are dumped from

Bags are discharged through large rotary valve located at bottom of collector's hopper

of approximately 400 paper bags a day. Dust-free working conditions are assured.

(Further information about Dustube dust collectors may be obtained from Wheelabrator Corporation, Mishawaka, Indiana.)

Check 2514 opposite last page.



► A NEW SOLUTIONS ARTICLE
**Use of radiant heat
trims batch time
from 12 to 6 hr**

paper bags prior to being added to processed fish oil used for manufacturing high quality protective paints.

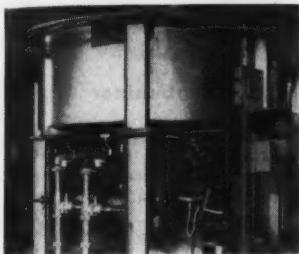
Solution: Dust collector was installed that not only handles the dust problem, but also

Rapid heating, better control ups lubricant output

Radiant heat has doubled production capacity of heavy lubricants at Warren Refining & Chemical Company, Cleveland, Ohio. By cutting heating

period from eight to four hours, and cooling time from four to two hours, plant is able to turn out two batches a day, instead of only one.

Heating and precision temperature control (within $\pm 2^\circ$ F) is achieved by direct-fired, radiant heat, created by burn-



Processing vessel is mounted only 10" above radiant heat burners, permitting rapid heat transfer and accurate control

ing a controlled gas-air mixture against refractory surfaces of specially designed burners. Units beam the radiant heat to bottom of kettle, which is located only 10" above the setting.

Combination of controlled rate of heat transfer and close proximity of heat source to the vessel permits fast heating. Operation is such that there is no harmful flame impingement on bottom of kettle. "Hot spots" in product are avoided, assuring absence of charring or discoloration of product.

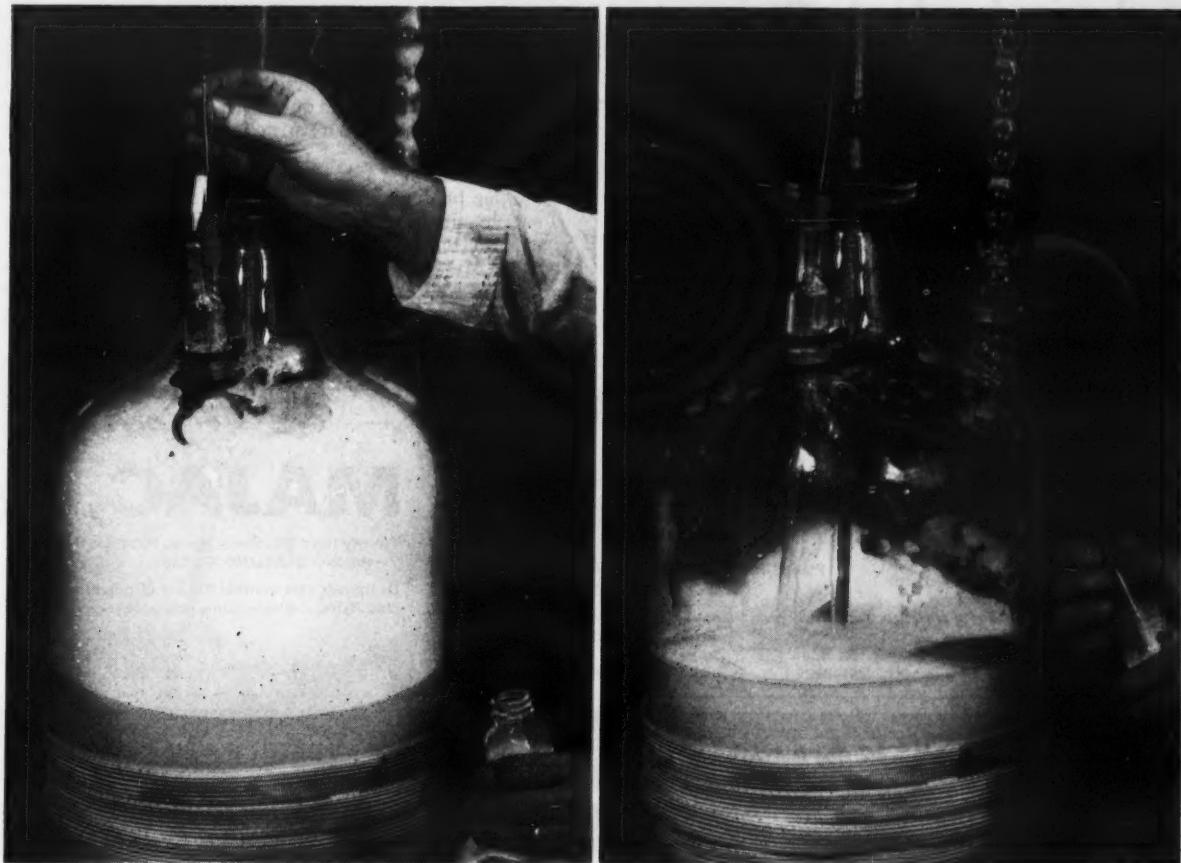
(Gradation heating system, using Duradiant burners, was designed and built by Selas Corporation of America, Dresher, Pa.)

Check 2515 opposite last page.



"The entire plant is run automatically!"

See How Foam Robs You



Silicones stop foam; help you operate at maximum capacity

Why accept foam as a necessary evil, when you can control it effectively and economically with Dow Corning Silicones? Amazingly effective in trace quantities, these silicone antifoamers enable you to utilize capacity now taken up by foam . . . help speed processing . . . prevent spill-overs . . . reduce fire hazards . . . cut maintenance costs.

Serving Every Industry. Dow Corning job-proved silicone defoamers and antifoamers neither alter nor adulterate products or processes. And they're effective against even the most violent and persistent foams. Typical applications include processing of adhesives, chemicals, petroleum, asphalt, paper, paints, textile and drugs; also useful in metalworking and laboratory work. In food processing, the use of food grade Dow Corning antifoamers at designated levels is sanctioned by FDA.

"ABC's of Defoaming" — new 8-page brochure gives full data. Write today for free copy. Address Dept. 2114.



Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.
Check 2516 opposite last page.

Easy to Use. You don't need extra equipment or preparation time when you use Dow Corning Silicones to control foam. Our product development group has formulated different types to be most adaptable to different systems . . . to help you rid your process or product of foam problems effectively, economically.

Free Sample. Here's your chance to see how Dow Corning Silicones can work for you. Tell us your foam problem and type of system — oil, aqueous, nonaqueous, food product or other. A generous trial sample of the silicone defoamer most suitable for your process will be sent by return mail. Write Dept. 2114.

Hard abrasive aluminas pulverized and classified by unique MAJAC principle



Check 2517 opposite last page.

MAJAC, Inc.

Twenty-third St., Sharpsburg, Pittsburgh 15, Pa.
Telephone STERLING 2-2435

Designers and manufacturers of pulverizing,
classifying and separating equipment for industry.

2592



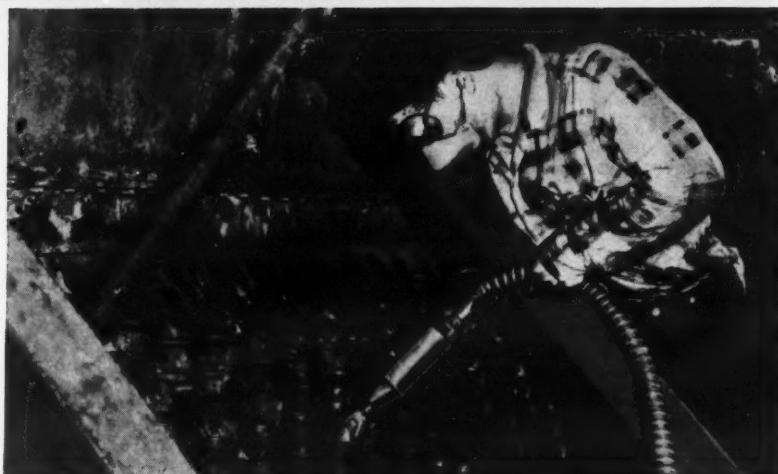
Tom Thumb mixer . . .

. . . duplicates results of full-size production unit. Believed to be smallest of its kind available for laboratory use, tiny mixer is replica of manufacturer's large, vertical planetary mixer. Materials are held in stainless-steel jacketed container. Mixing is done by double planetary motion. Like its big brother, unit can also be adapted for pressurized mixing. (Further information about mixer may be obtained from Chemical Machinery Division of Baker Perkins Inc., 1000 Hess, Saginaw, Michigan.)

Check 2519 opposite last page.

BETTER TOOLS FOR BETTER WORK

How to clean badly plugged air preheater tubes



Use a powerful Wilson air-driven motor and a heavy carbide-tipped drill bit to clean boiler air preheater tubes in one pass! This is only one of hundreds of tube maintenance jobs where it pays to WILSONIZE TO ECONOMIZE.

Wilson's wide range line also includes powerful tube cleaners, fast, accurate tube expanders as well as Torq-Air-

Matic automatic expander drives. Tube cutters, tube pilots, tube knockout tools, right angle worm gear drives—the list of economical Wilson tube maintenance tools is almost endless. Write for your free copy of Wilson Catalog 77-88. It's a mine of information on tube cleaning and tube expanding—in fact, all tube maintenance problems. TW 910

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Check 2518 opposite last page.

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For the engineer who refuses to stagnate



HALF the world is half asleep! Men who could be making twice their present salaries are coasting along, hoping for promotions but doing nothing to bring themselves forcefully to the attention of management.

They're wasting the most fruitful years of their business lives . . . throwing away thousands of dollars they may never be able to make up. And, oddly enough, they don't realize—even remotely—the tragic consequences of their failure to forge ahead while time is still on their side.

Engineers and other technically-trained men are particularly prone to "drift with the tide" because their starting salaries are reasonably high and promotions come at regular intervals early in their careers. It isn't until later—too much later in many cases—that they discover there is a definite ceiling on their incomes as technicians.

Send for Your Free Copy of "Forging Ahead in Business"

If you want to discover how to succeed while you are still young—if you want to avoid the heartbreak of failure in later years—send today for "Forging Ahead in Business" . . . one of the most practical and realistic booklets ever written on the problems of personal advancement.

Here you will find—not a "pep-talk," not an academic lecture—but cold, hard facts on how to improve your position and increase your income. You will be told what the qualifications of an executive are in today's competitive market . . . what you must know to make \$15,000, \$20,000 or more a year . . . what you must do to accumulate this knowledge.

"Forging Ahead in Business" was written for mature, ambitious men who seriously want to get down to bed-rock in their thinking about their business future. If you feel it is meant for you, simply fill in and return this coupon. Your complimentary copy will be mailed to you promptly.

Check 2520 opposite last page.

FEBRUARY 1961

vibrating principle which gives it an oscillating rotary motion about its center.

Foreign matter remains in suspension and does not adhere to the mesh, excluding possibility of clogging and assuring a constant flow of material.

Mechanism which generates vibration is adjustable to produce varying degrees of movement. Screen assembly is fas-



Operator feeding powdered raw materials to sifter. Screen assembly can be removed for cleaning in matter of seconds

tened by three spring clamps and can be removed for cleaning in matter of seconds.

Machine is powered by a built-in, totally-enclosed motor. With the exception of fly wheel, no bearing surfaces are used.

Results: The mobile, oscillating screens sift the pharmaceuticals fast and efficiently. Depending upon screen size and type of material being processed, capacity of a unit ranges from a few pounds up to several hundred pounds per hour. Operation is essentially dust-free.

The screens have required little, if any maintenance. Cleaning is easy, since entire screen area is exposed.

(Further information about Vorti-Siv vibrating screen may be obtained from J. M. Lehmann Company, Inc., 550 New York Ave., Lyndhurst, New Jersey.)

Check 2521 opposite last page.



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For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

NEW LITERATURE
Processing Equipment

Features of continuous, vacuum-disc filters are described in four-page bulletin. Diagrams and photograph are included. Sizes range up to 2500 sq ft. Bul 404—Filtration Engineers Division, American Machine and Metals, Inc.

Check 2522 opposite last page.

Complete line of finned-tube heat transfer equipment is summarized and illustrated four-page brochure. Thermal and mechanical advantages of this design are reviewed. Bul 800—The Brown Fintube Company.

Check 2523 opposite last page.

Wiped-film evaporator for use with products that are heat sensitive, viscous, or low in thermal conductivity—is described in Bul 991. Cut-away view is shown. Specifications for 12" and 36" diam models are also included. Bul 991—The Pfaudler Co., Division of Pfaudler Permutit Inc.

Check 2524 opposite last page.

Heat transfer and chemical process equipment is reviewed in four-page bulletin. Manufacturer's fabricating services are also described. Bul 51—Niagara Weldments Inc.

Check 2525 opposite last page.

Air filter that can be washed and cleaned without removing from filter bank is explained in four-page bulletin. Unit uses single sheet of synthetic plastic material perforated with thousands of tiny openings. Bul 208—American Air Filter Company, Inc.

Check 2526 opposite last page.

Fifty-five types of continuous processing equipment for treating finely-divided solids suspended in liquids are described in revised 16-page brochure. Among operations covered are agitation, centrifuging, filtration and drying. Bul 7004—Dorr-Oliver Incorporated.

Check 2527 opposite last page.

How to get the most out of your crusher is told in 21-page book. Good and bad crushing practices are outlined with help of photographs. Crusher Handbook—Nordberg Mfg. Co.

Check 2528 opposite last page.

Porous Teflon and Kel-F filter media are explained in four-page bulletin. Complete specifications of discs and sheets are reported. Bul P-103—Porous Plastic Filter Company, Inc., Subsidiary of Pall Corporation.

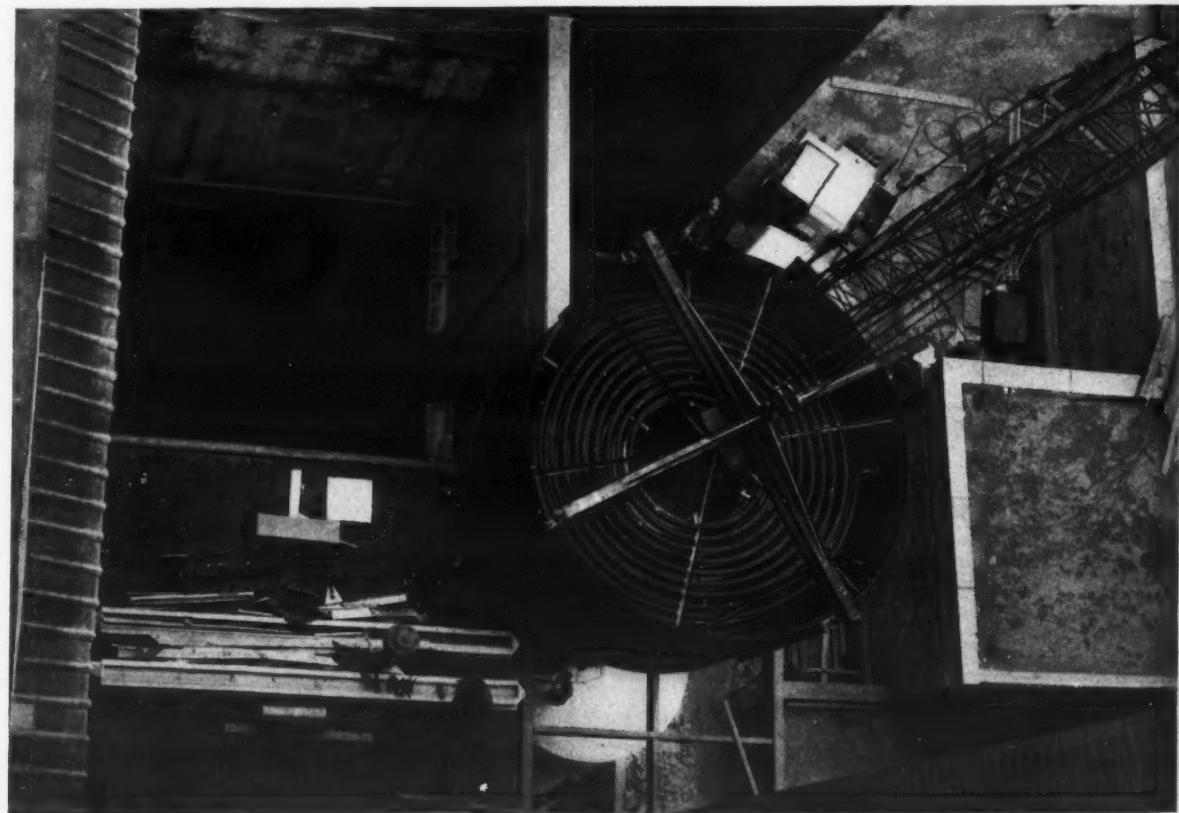
Check 2529 opposite last page.

Seagram's "to be sure" for its new

ON these pages, you see what is known in distilling as a "doubler". Doubling is further distillation of beverage spirits in a "doubler" or copper kettle to acquire an additional degree of refinement. Coupled with a larger capacity, this doubler offers a distinct advantage—a larger distillation cycle resulting in a greater uniformity of product. These are some of the reasons for the consistently fine quality of Seagram products.

This doubler was fabricated in three sections which were transported on flat-bed trucks from the copper-smithing plant of Matt Corcoran & Company, Industrial Boulevard in Louisville, Kentucky to the port of shipping at Aurora, Ind. From there, they were trucked to the Joseph E. Seagram & Sons, Inc. Distillery at Lawrenceburg, Indiana.

In order to install the doubler it was necessary to remove the roof from a distillery building. Once in the building, the



used REVERE COPPER “Doubler”..

three sections were welded together, and the roof was replaced.

Revere Copper was selected for the doubler because the inherent characteristics of man's oldest metal have proved superior in distilling fine whiskey. It does not react with alcohol and a wide variety of other liquids and gases.

And, as to the advantages of working with copper, Matt Corcoran & Company, who has been working with this metal for over a half century has this to say, "Copper is extremely easy to work into any desired shape or design, it conducts heat quicker and with greater uniformity than any other commercial metal, and is quickly and economically welded by modern methods. This latter characteristic of copper was particularly important in the Seagram installation. In this case the three-section doubler had to be welded together under conditions where there was barely room for a man to get between the sides of the vessel and the walls

of the building in which it was installed."

And, it was because of these same superior characteristics that copper was used in the interior of the doubler in the form of Revere Copper Tube . . . 1,000' of 4" O.D.

It is jobs such as this doubler that have given Revere the background of experience that can prove valuable in the solution of your particular metals problem . . . whether it involves copper, brass, aluminum, or any one of their alloys.

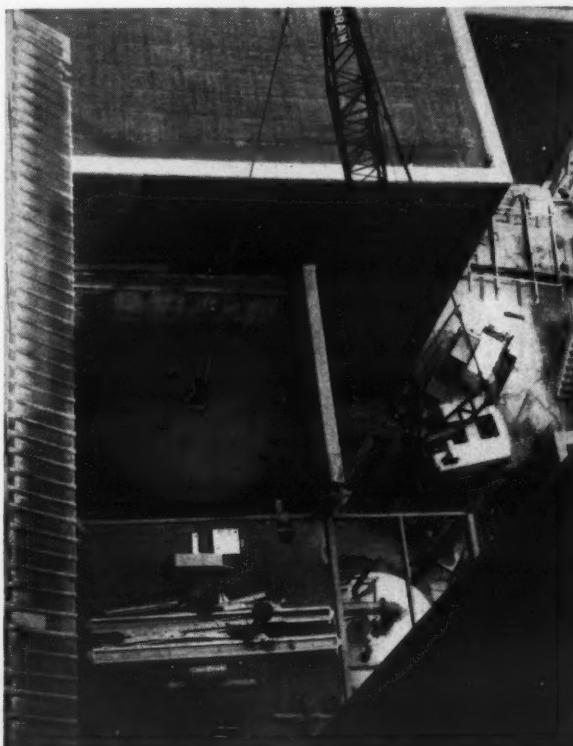


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Distributors Everywhere.



(left)—**LOWERED BOTTOM SECTION** of the doubler into position. (above)—**TOP SECTION OF DOUBLER** is fitted into place. You can readily see why it was necessary to remove roof prior to installation. (above right)—**TOP SECTION OF DOUBLER** being removed from flat-bed truck and placed aboard barge preparatory to trip to Aurora, Indiana, from where the three sections were trucked to the Joseph E. Seagram & Sons, Inc., Distillery at Lawrenceburg, Indiana.

Check 2530 opposite last page.

Heat transfer equipment is topic of 32-page catalog. Numerous machines are described, including supercharger air coolers, industrial oil field equipment and heating and air conditioning products. Nuclear heat transfer applications are also discussed. Cat 160—Young Radiator Company.

Check 2531 opposite last page.

How recent developments in design of tilting pan filter made unit increasingly useful in chemical processing is described in eight-page bulletin. Visual representation of filtration cycle illustrates time segments for wash, air sweep, cake discharge and vacuum purge. Bul F-2038A—The Eimco Corporation.

Check 2532 opposite last page.

Engineering data highlights 24-page catalog about line of heat exchangers for commercial and industrial hot water heating. Over 12 pages of statistical tables are included. Sample calculations illustrate how to choose proper size unit. Cat 601—Old Dominion Iron & Steel Corporation.

Check 2533 opposite last page.

Applications of rotating discs for pelletizing or mixing operations are reviewed in four-page bulletin. Plan for renting 39" diam discs for research and pilot plant study also is presented. Bul 247—Materials Handling Department, DRAVO Corporation.

Check 2534 opposite last page.

Centrifuges and homogenizers are reviewed in 16-page catalog. Highlighted is a continuous flow centrifuge system with removable polyethylene liners. Schematic drawing is included. Cat 260—Lourdes Instrument Corporation, division of Labline, Inc.

Check 2535 opposite last page.

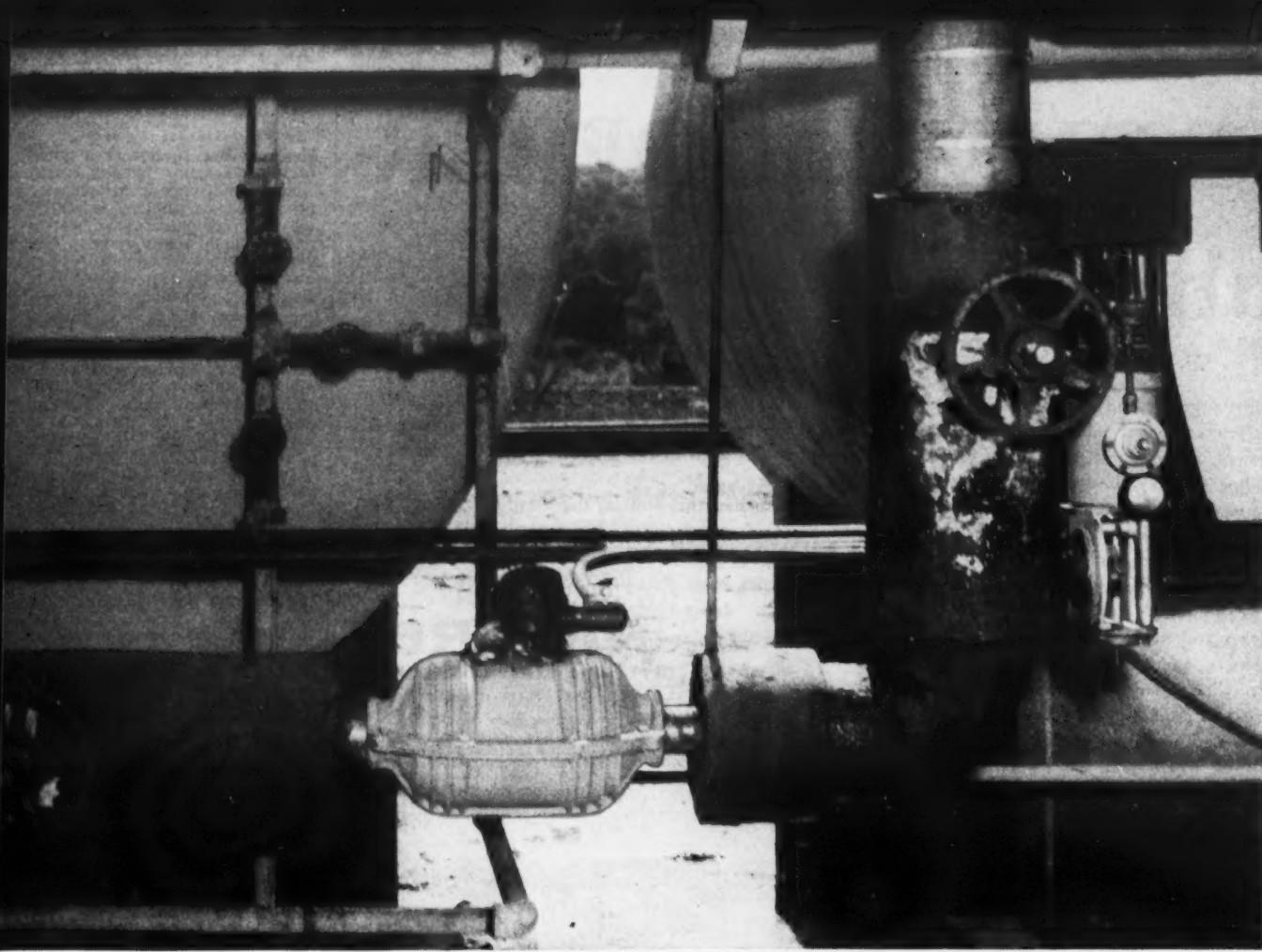
Blenders, dryers, mills and other processing equipment are depicted in 16-page catalog. Ceramics section is included, discussing grinding media and linings. Processing Equipment Catalog—The Patterson Foundry and Machine Company.

Check 2536 opposite last page.

NEXT MONTH

Take a trip with us to Pennsalt Chemicals' modernized chlorine-caustic facilities at Wyandotte, Michigan. Total cost of renovation project was \$6 million. Included in the program was replacement of 5000 old diaphragm-type electrolytic cells with 200 large, modern, 30,000-ampere units.





One of six Foxboro Magnetic Meters at International Salt Company's Avery Island Refinery. Meters are measuring 220°F sodium chloride brine being discharged from filters on International's Recrystallizer Process.

Foxboro Magnetic Flow Meters handle 220°F salt brine just like water!

"trouble-free" — International Salt reports

220°F — that's the temperature of sodium chloride brine as it leaves filters at International Salt Company's Avery Island Refinery in Louisiana. And their 6 Foxboro Magnetic Meters have been providing continuous, trouble-free flow measurement of this highly corrosive liquid for over a year.

These meters easily handle this punishing chemical. They're lined with corrosion-proof Kel-F — have no flow restrictions of any type. Linear meas-

urement — accurate to $\pm 1\%$ across the entire scale — is indicated on remote Foxboro Dynalog* instruments.

Since its introduction 5 years ago, the Foxboro Magnetic Meter has simplified the measurement of difficult liquids in hundreds of industrial processes. Ask your nearby Foxboro Field Engineer how it can help your process. Or write for Bulletin 20-14. The Foxboro Company, 812 Neponset Avenue, Foxboro, Massachusetts.

*Reg. U. S. Pat. Off.

For
more information
on product at
left, specify 2537
see information
request blank
opposite last page.



Foxboro Dynalog Instrument indicates flow rate through any one of the 6 Magnetic Meters — at the flip of a switch.

FOXBORO

REG. U. S. PAT. OFF.



A
NEW SOLUTIONS
FEATURE

BY SUBSTITUTING a 12-sided paperboard container for forty 50-lb bags to ship litharge (lead oxide pellets), a chemical company is helping a customer trim unloading time as much as 93%.

The one-ton-capacity, one-way container, 26½" high and 26" in diam, is also credited by both customer and supplier with eliminating breakage, improving safety, and simplifying inventory-keeping.

Hammond Lead Products, Inc., Hammond, Ind., maker of lead pigments and lead chemicals, is using the bulk container for trucking litharge to Corning Glass Works' Albion, Mich., plant where the material is used in the manufacture of electronic glassware.

Fabricated of 600-lb-test double-wall paperboard, the container is stored flat until needed. It consists of a tube and two identical die-cut caps for the top and bottom. When the unit is assembled, these are bound with steel strapping, and the container is mounted on a wooden pallet.



Chemical company and customer gain as 12-sided paperboard container takes over litharge-lugging job and eliminates breakage, reduces handling, improves safety and simplifies inventory . . .

Shift from bags to bulk box pares 93% off unloading time

The multi-sided character of the container reflects a modern application of an old geometrical principle — that a cylinder is stronger than a square shape. The 12 sides duplicate the structural effect of a cylinder.

Use of the containers has enabled Corning to achieve some eye-opening savings in handling time. Unloading of a truckload of the containers, 32,000 lb (16 containers), is being accomplished in 1/16th the time (eight manhours) previously required for unloading bags.

To slit and empty 40 bags of litharge

into a use hopper required 15 minutes. A ton container can be emptied in less than five minutes. The fork-truck operator simply lifts the box into position, slits a triangle at the base to form a fold-out spout, and tilts the box.

At Hammond Lead, the most important handling economy realized is in the litharge-filling operation. Instead of 40 bags to fill and close, a partially assembled container is carried by lift truck to the filling machine, filled, capped, and routed to storage for later shipment.

Since the bags previously used were palletized, other handling operations are comparable. Storage requirements are about the same since the ton containers use the same pallets as were utilized for bags.

By reducing the number of times lead oxide, a toxic material, must be handled, the safety factor has been improved.

In the first six months of use, not one instance of breakage or damage in shipment was reported.

Inventory, once a tedious matter of threading through row after row of ceil-



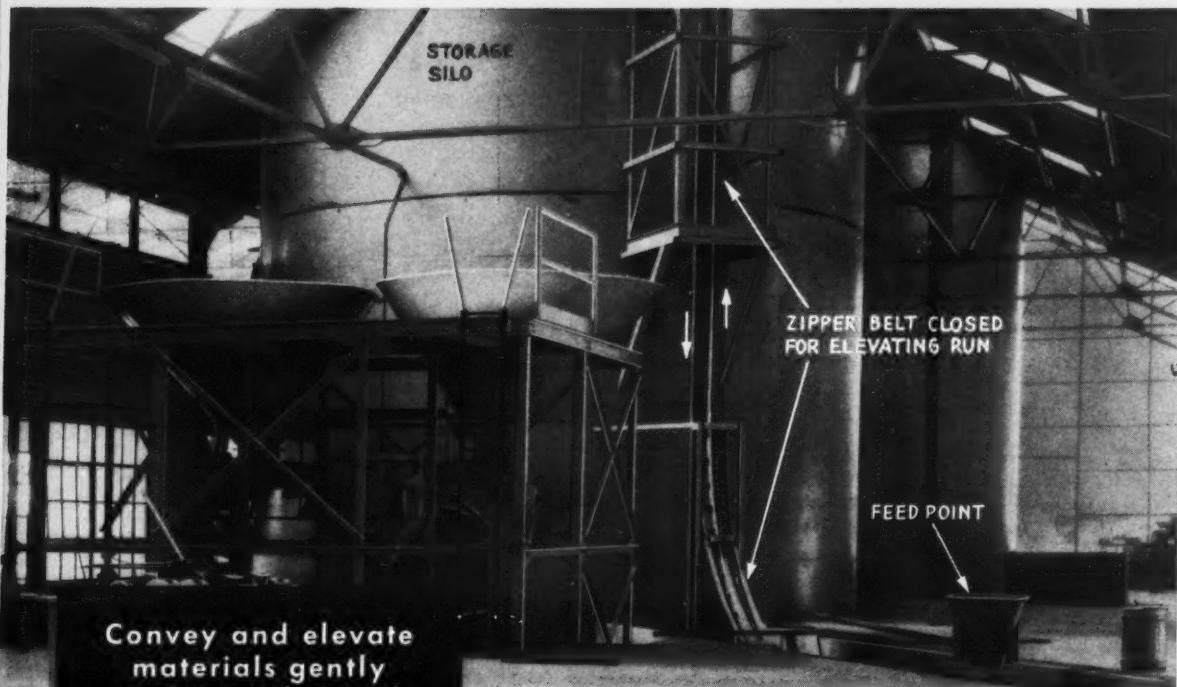
Six tons of litharge can be packaged in the collapsed boxes (right) and lids (left) that Foreman C. W. Ziebell is holding

Instead of 40 bags to fill and close, operator fills one paperboard container. Flow of litharge pellets from feeder is controlled by means of rheostat



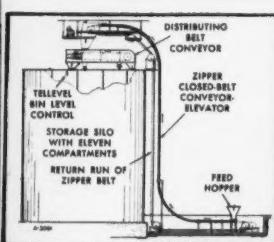
Triangular slash from metal band to bottom of container forms spout through which pellets pour when box is tilted

STEPHEN'S-ADAMSON

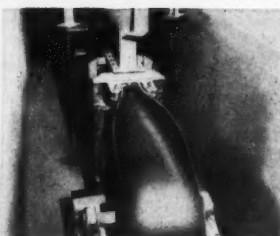


Convey and elevate materials gently within sealed and dust-tight belt with

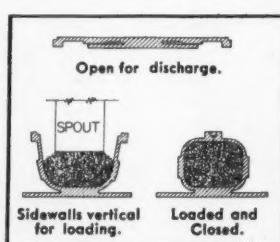
"ZIPPER" CLOSED-BELT CONVEYOR-ELEVATOR SYSTEMS



Drawing shows typical "ZIPPER" Closed-Belt Conveyor-Elevator installation.



"ZIPPER" Closed-Belt Conveyor-Elevator shown open to receive material at feed point.



Loading and Unloading Cycle of "ZIPPER" Closed-Belt Conveyor-Elevator.



Upper left, unit closed and loaded. Lower right, belt opened and closed by system of ball bearing rollers.



Write for
Bulletin
349

ENGINEERING DIVISION STEPHEN'S-ADAMSON MFG. CO.

GENERAL OFFICE & MAIN PLANT 11 RIDGEWAY AVE., AURORA, ILL.

PLANTS LOCATED IN: LOS ANGELES, CALIF. • CLARKSDALE, MISS.
BELLEVILLE, ONT. • MEXICO CITY, D.F.

Check 2538 opposite last page.

ing-high stacks of bags can now be accomplished with little more than a quick glance.

So successful has the experiment been that Hammond and Corning are now testing the feasibility of using a king-size 2500-lb container. This container has the same girth as its predecessor, but is 6½" higher.

Corning estimates that a switch to the 2500-lb container would add additional 20% saving in manhours to the economies already accrued.

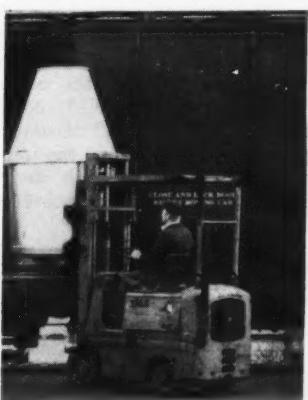
(Twelve-sided paperboard containers are a development of Union Bag-Camp Paper Corporation, 233 Broadway, New York 7, N.Y.)

Check 2539 opposite last page.

Bulk bins can be nested when empty, cutting shipping space 75%

Liquids, pastes, granular materials handled

Uses: Re-usable aluminum container for shipping and in-plant handling of liquids, pastes or granular materials.



Cone-shaped bulk containers for granular materials are shown being loaded onto a boxcar

Features: When empty, containers may be disassembled so that units can be quickly cleaned or "nested" inside one another like paper cups to reduce return shipping space by 75%.

Description: Container consists of two cylindrical units

HANDLING & PACKAGING

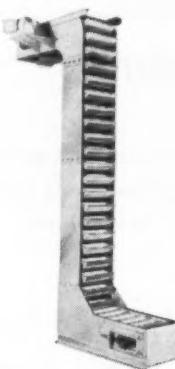
joined by a peripheral clamp ring and hermetic seal.

Two models are available. A liquid model is offered with capacities of 440, 550 and 660 gal, each equipped with ball valve for controlled discharge. A granular model has capacities of 54 and 70 cu ft, both with 22½" discharge opening and 70° cone angle to assure complete dumping.

Average tare weight is 192 lb. Container height varies from 63½" to 91½".

(Nest-A-Bin bulk containers are manufactured by Kaiser Aircraft & Electronics Division of Kaiser Industries Corporation, Kaiser Center, 300 Lakeside Dr., Oakland 12, Calif.)

Check 2540 opposite last page.



Spillage prevented

... at the filling point by the overlapping feature of the bucket of elevator which is available in a wide range of bucket sizes to accommodate the cubic footage of product to be moved per hour.

Buckets are of cast aluminum alloy but are available with a non-toxic epoxy coating. Since buckets face out on the return side, cleaning can be accomplished while the conveyor is in motion.

Elevators are built to the user's requirement of vertical height, top horizontal extension and bottom horizontal.

(Verti-Lift bucket elevators are manufactured by Aseco Inc., PO Box 862, Los Angeles 28, Calif.)

Check 2541 opposite last page.

GENERAL AMERICAN AIRSLIDE® CARS ...NOW MORE THAN 4500 IN SERVICE!



918 BUILT AND DELIVERED IN 1960

Demand for these highly efficient cars is big ... and steadily growing. Introduced only 6 years ago, the AIRSLIDE car's reputation for safe, bulk shipment and speedy unload-

ing has now made this car the standard for granulated and powdered materials. It is especially desirable for those materials which tend to bridge or pack or which do not normally flow by gravity.

HOW AIRSLIDE CARS HAVE BEEN RECEIVED BY INDUSTRY Here are some of the commodities Airslide Cars are handling: Flour (Wheat, Oat, Semolina, Soya), Sugar (Beet, Cane, Corn), Starch, Chemicals, Plastic Powders, Weed Killers, Activated Carbon, Bentonite, Clay (phosphatic), Ores.

If you are not already taking advantage of AIRSLIDE CARS, it will pay you to get complete data. Write today to:

Airslide® and Dry-Flo® Car Division

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South LaSalle Street
Chicago 3, Illinois
Offices in principal cities



Check 2542 opposite last page.

KNOX

IRON FREE

Tower Packings

- KNOX Tower Packings resist high temperatures, fumes, vapor, corrosion.
- Resistant to alkalis, acids, liquids.
- Complete vitrification firing provides zero porosity, assuring indefinite life chemically.
- Uniform quality, high chemical purity, iron free, great mechanical strength, will not crumble.

KNOX PORCELAIN CORPORATION
KNOXVILLE 1, TENNESSEE

Check 2543 opposite last page.

JUSTRITE

SAFETY CANS AND OILY WASTE CANS

... safety-proved in hundreds of plants!

The hazards of fire and explosion are two of the greatest dangers to plant safety. For more than 50 years, JUSTRITE has specialized in the development and manufacture of safe-

ty cans that have Underwriters' Laboratories and insurance companies' approval. Why not standardize on the safety equipment that has been proved in thousands of situations?



OILY
WASTE
CANS



SAFETY CANS



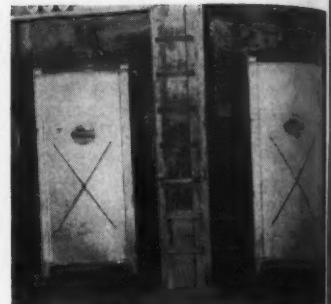
IMPROVED
PLUNGER
CANS

ASK YOUR INDUSTRIAL DISTRIBUTOR

JUSTRITE MANUFACTURING COMPANY
2061 N. SOUTHPORT AVE., CHICAGO 14, ILL.

Check 2544 opposite last page.

MATERIAL HANDLING and PACKAGING



BEFORE—Scoop truck, backing out of bin with load of grog, drags dust into aisle. AFTER—Bins are loaded alternately and automatically without spillage, then transferred to storage for later use

Swing to semi-bulk bins clears air of grog dust at Johns-Manville plant

Contamination eliminated, housekeeping headache abated, storage needs halved and handling costs cut \$4000 a year

R. N. PAGE, Supervisor
Industrial Engineering
Johns-Manville Corporation

A
NEW SOLUTIONS
FEATURE

CLEANING UP a dust problem at the Zelienople plant of Johns-Manville Products Corporation not only eliminated contamination and housekeeping headaches, but trimmed \$4000 off the annual handling tab while increasing storage space.

The dust was generated in the collecting, storing and conveying of calcined process material (commonly called grog) used in the manufacture of insulating fire brick.

Covered self-dumping hoppers were used to collect the various grades of grog from overhead bins. Filled at a single collection station, these were transported by fork truck to the storage area and emptied into open bins. Later the grog was picked up by

scoop truck and dumped into the use bins.

Both the dumping and the pick-up operations created dust. Contamination resulted when dust of one grade settled on other grades in adjacent open storage bins. The effect of this was not too serious since the percentage of contamination was small.

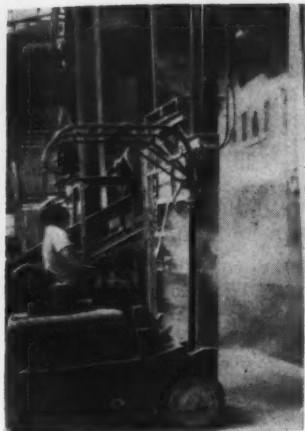
However, the system offered another more serious possibility of contamination—that of accidental mixing of grog grades in the storage bins.

Since some grades are similar in appearance, the truck operator could easily dump a load into the wrong bin. Once dumped it would be impossible to tell that a mistake had been made, but the effect on brick quality could be significant.

In considering solutions, one major hurdle had to be overcome — changeover had to be affected without interfering with production.

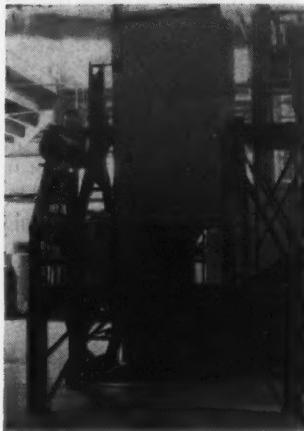
After analyzing a number

HOW TENCO DIVISION OF MINUTE MAID MAINTAINS GOOD HOUSEKEEPING...



BEFORE—Dust cloud is starting to form as scoop truck (left) dumps load of grog into dry mix bins in molding department.

AFTER—Dust is non-existent and floor clean as grog flows from inverted semi-bulk bin into screw conveyor feeding use bin



of possibilities, a system utilizing portable bins was adopted, and the self-dumping hoppers and scoop truck eliminated.

Fabricated from steel, the bins have an internal transition cone welded to the four side walls. The cone conforms to the angle of repose of the commodity when full and assures complete unloading. Closure is standard drum-type for the single 22½" diameter opening. Bin is mounted on four legs. Shoulders are equipped with nesting pockets for tiering.

A trunnion tube running through the midsection of the bin permits insertion of the mandrel of inverting device. Johns Manville uses 77 bins in its system, which has been in operation since March 1960.

Collection is arranged so that two bins are filled alternately. Filling is controlled automatically. The full bin can be removed while the second bin is being filled.

Use of a sleeve and cone arrangement eliminates the dust. Grog flows through this into the bin and, when filling is complete, material backed up into the sleeve is shaken down into the bin.

Full bins are transported by fork truck to storage where they can be double tiered. This, coupled with the elimina-

tion of the old open bulk bins, cuts storage requirements in half.

When grog is needed in manufacturing, a bin is taken by fork truck to the inverting equipment located over a screw conveyor feeding the use bin. Here, a cone with an iris valve and sleeve is attached to the opening on top of the portable bin. The iris valve controls the flow and permits shut-off and removal at any time.

The portable bin is then inverted, the sleeve attached to the opening over a screw conveyor, and the valve opened. From this point, emptying is automatic since the conveyor is adjusted to maintain a surge of the material into the use bin.

A bin indicator, equipped with a light, signals when the bin is empty so that another can be placed in position. The surge of material in the use bin is adequate to permit this changeover without delaying the operation.

In addition to completely eliminating the dust problem, handling has been reduced by the fact that the bins accommodate double the amount of material formerly handled by the 2300-lb-capacity hoppers, and five times the amount hauled in a truck scoop. This



WITH RICHARDSON AUTOMATIC SCALES

Ceaseless inspection on a round-the-clock basis is the price TENCO is glad to pay for its enviable record in plant sanitation. It was this meticulous attention to detail and process improvement which forced the messy platform scale and scoop operation, with all its spillage, to give way to the Richardson Automatic Bagging Scale for packaging bulk instant coffee. Besides helping with housekeeping Richardson saves valuable material for TENCO, too.

Richardson automatic bagging and proportioning scales are promoting good housekeeping, controlling quality, saving labor and material in hundreds of food plants. They are ready to go to work for you, too. Why not phone or write Richardson Scale Company, Clifton, N. J.

Send for free
technical bulletin



RS-12

Richardson

MATERIALS HANDLING BY WEIGHT SINCE 1902

Sales and service Branches in Principal Cities.
Also manufactured in England, France
and Australia. Richardson Scales conform
to U. S. Weights and Measures H-44
for your protection.

Check 2545 opposite last page.

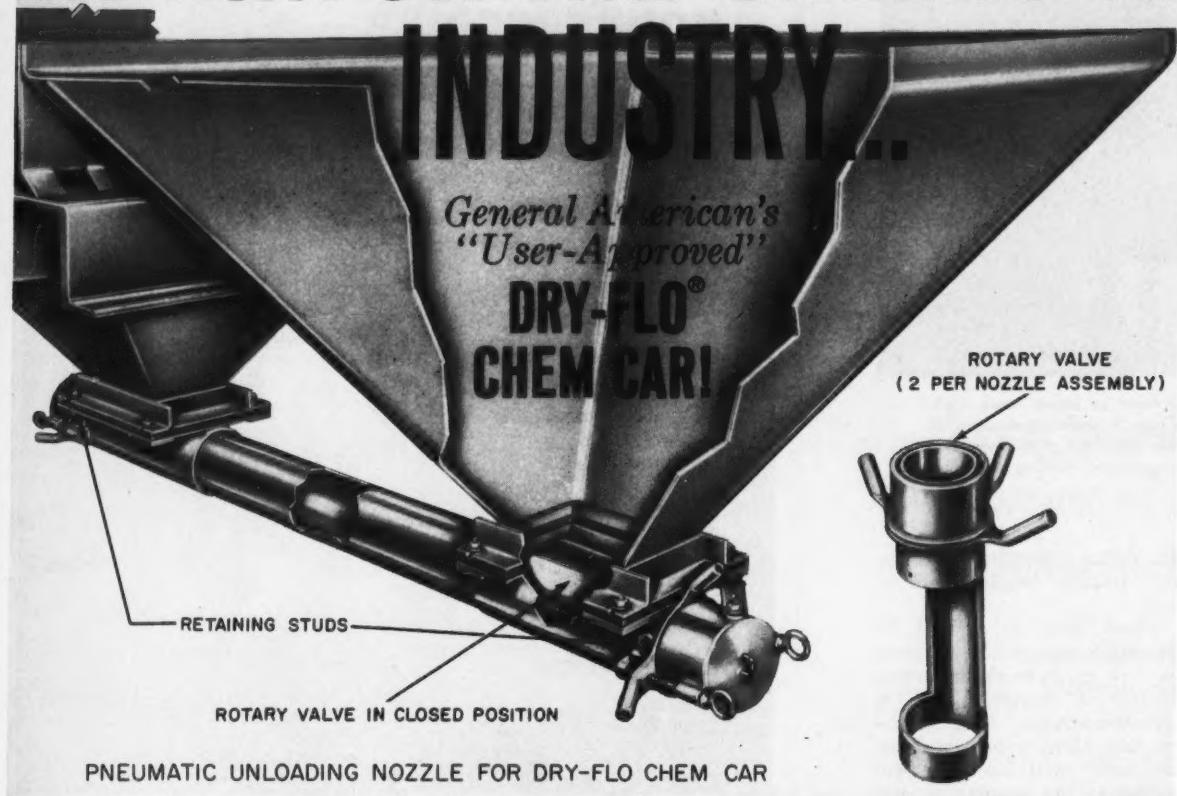
NEW...FOR THE CHEMICAL INDUSTRY

*General American's
"User-Approved"*
**DRY-FLO®
CHEM CAR!**

RETAINING STUDS

ROTARY VALVE IN CLOSED POSITION

PNEUMATIC UNLOADING NOZZLE FOR DRY-FLO CHEM CAR

ROTARY VALVE
(2 PER NOZZLE ASSEMBLY)

Designed especially for dependable, safe bulk shipment of polyethylene, polystyrene, polypropylene and similar chemicals in dry form.

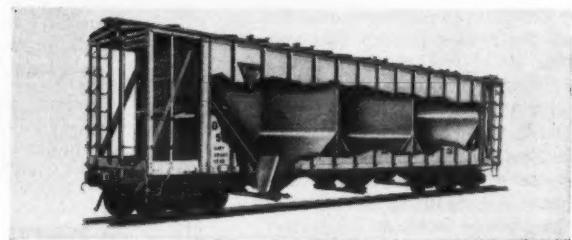
The new 3,500 cu. ft. capacity Dry-Flo Chem Car was developed for the chemical industry to provide a car which would assure freedom from contamination and moisture pick-up while in transit and during unloading.

The car is welded throughout, has fully-gasketed openings, unloading nozzles (created especially for pneumatic unloading) designed for fast disassembly—speedy and complete cleaning. Also the car is divided into three separate compartments.

Illustrated is a schematic view of the new, exclusive General American unloading nozzle. Unloading flow can be controlled to accommodate

individual unloading systems. Three outlets are provided on each car, thus requiring fewer connections and adjustments, minimizing the possibility of contamination.

275 of these cars are already in service or on order. If you would like further information on the Dry-Flo Chem Car, write to . . .



Airslide® and Dry-Flo® Car Division

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South La Salle Street • Chicago 3, Illinois
Offices in Principal Cities



Check 2546 opposite last page.

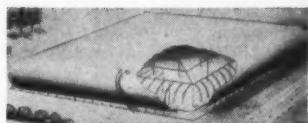
savings, plus that from reduced housekeeping, amounts to \$4000 annually.

The reduced storage requirements have permitted near by storing of bagged material which formerly had to be kept in a warehouse 100 yd further from point of use. This has cut trucking costs.

Changeover to the portable bins was accomplished without interrupting production.

(The Invert-A-Bins are manufactured by Powell Pressed Steel Company, Hubbard, Ohio.)

Check 2547 opposite last page.



Optimum use of site

. . . for storage space is obtainable with a bulk liquid storage tank designed to take advantage of every square foot of space.

Up to 16% greater storage capacity is claimed for low-cost, ground-level tank which is fabricated of lighter steel and requires a minimum of shop forming and prefabrication. Erection on the site can be accomplished with a small crew and light equipment.

(Cylindroid tank is a development of Graver Tank & Mfg. Co., division of Union Tank Car Company, 4809 Tod Ave., East Chicago, Indiana.)

Check 2548 opposite last page.



THAT'S
INTERESTING

**Use tritium
to find oil**

Soviet scientists described a technique for using tritium, triple-weight radioactive hydrogen, in finding oil. The report was given at a UNESCO-IAEA sponsored radioisotope conference in Copenhagen.

Tritium is used to trace water pumped down holes in oil fields.

Geiger counters lowered into nearby holes can detect presence of radiation given off by the radioisotope.

By charting the position of holes in which tritium is detected, underground water layers can be mapped. This information narrows the area in which geologists can expect to find oil.

For more information on product at right, specify 2549 see information request blank opposite last page.



Towmotor backs up outstanding performance



with Towmotor dependable service

When you purchase Towmotor equipment you can be sure it will never be out of service very long... for two very good reasons:

1. Towmotor fork lift trucks are built to last, and built to perform continuously.
2. When needed, you get fast and skillful repair and maintenance service from your local dependable Towmotor representative.

Your Towmotor representative will never let downtime cut into the money you save by owning a Tow-

motor fork lift truck! That's why Towmotor customers keep buying Towmotor equipment. Ask for complete information on Towmotor equipment and Towmotor Preventive Maintenance Service. Write Towmotor Corporation, Cleveland 10, Ohio.



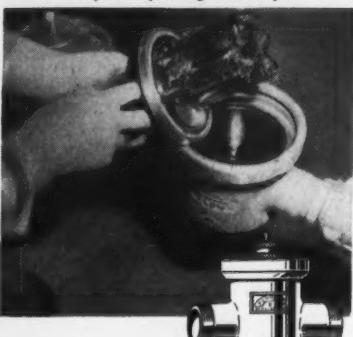
FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919

*Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation



ERIEZ Magnetic Minute

60 seconds that will help you improve operating efficiency.



Here's POWERFUL MAGNETIC PROTECTION for LIQUID PROCESSING EQUIPMENT

Handling liquids or slurries? Permanent Magnetic Ferrous Traps by Eriez protect against fine iron and tramp iron contamination to —

- Help assure product purity.
- Reduce damage and maintenance to filters, mixers, pumps, etc.
- Eliminate clogging and production slow-downs.

In the full line of Eriez Ferrous Traps there's a standard or sanitary model for your application . . . ideal for use with foods, chemicals, ceramic slips, hydraulic oil lines, etc. All models offer these characteristic benefits:

- Rugged cast one-piece bodies that easily withstand working pressures up to 150 psi.
- Clean, simple design — no moving parts.
- Magnetic element handles materials with temperatures up to 850° F.
- Easy to inspect and clean; magnetic element lifts from the body in seconds.

For technical and application data write to:

ERIEZ MANUFACTURING CO.
73PA Magnet Drive, Erie, Pa.



MAGNA-THOUGHT
Our greatest source of satisfaction is the acceptance our products have earned through superior performance and dependability.

M. L. Cramer

M. L. CRAMER
Office Sales Manager



A GROWTH COMPANY...
10 NEW PRODUCTS IN THE LAST 5 YEARS

Check 2550 opposite last page.

LATEST INDUSTRIAL TRUCK DEVELOPMENTS

. . . in design, capacity, operating features, and accessories for improved performance and safety



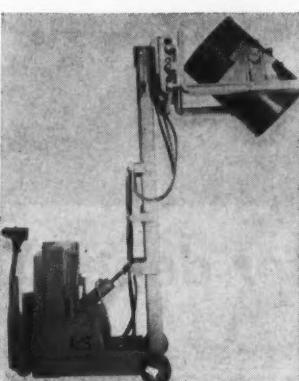
Palletless bag handling

. . . is possible with a fork truck attachment consisting of two side-shifting scoop-shaped arms, hydraulically actuated to clamp bags.

Scoop arms are 45" long and can be spread 67" wide or clamped to 17". Maximum side shift of clamps is 25" (12½" each side from centerline) when clamp opening is 42". Attachment has maximum capacity of 3500 lb.

(Bag-handling attachment is being introduced by Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich.)

Check 2551 opposite last page.



Detachable drum dumper

. . . permits counterbalanced "walkie" to be used for handling skids and pallets in normal operations. High-stacking electric-powered truck is equipped with quickly detach-



able clamp and drum up-end for 180° forward dumping of wooden and steel barrels.

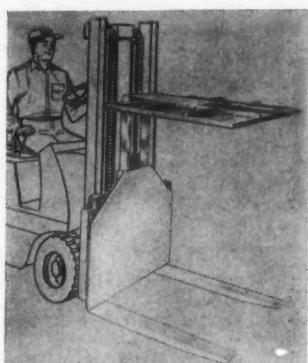
This combination permits operator to pick up, elevate and dump loads without leaving control handle of truck.

(Counterbalanced JackStacker with detachable clamp and drum up-end is described in Circular 90-131, Lewis-Sheppard Products Inc., 125 Walnut St., Watertown 72, Mass.)

Check 2552 opposite last page.

Safe transport assured

. . . for a variety of unstable loads with a hydraulically operated stabilizer which holds under positive control pallet-



ized bags, boxes, drums and barrels while loads are being transported.

A thin articulating pad provides minimum clearance when stacking, loading or unloading. All-welded unit offers a minimum loss of load center, hardened slide bars to prevent galling and scoring, full-floating cylinder and pilot-operated check valve to prevent loss of clamping pressure. It can be mounted on any make or model lift truck.

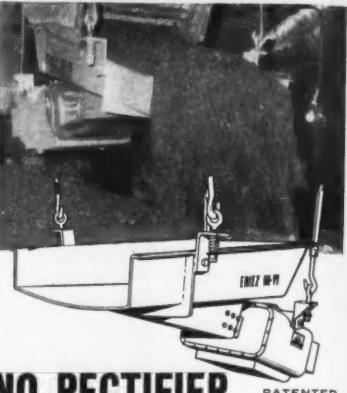
(Universal Load Stabilizer is a development of Little Giant Products, Inc., 1530-50 N. E. Adams St., Peoria, Ill.)

Check 2553 opposite last page.



ERIEZ Magnetic Minute

60 seconds that will help you improve operating efficiency.



NO RECTIFIER NEEDED WITH ERIEZ HEAVY-DUTY VIBRATORY FEEDERS

AC powered Eriez Hi-Vi vibratory feeders move large tonnages of bulk materials with accurate control . . . more efficiently and economically. Illustration shows one of a number of Eriez units available for heavy feeding applications where big capacity and accuracy are essential.

Whatever your application, there is an Eriez electro-permanent magnetic feeder that will meet your exact needs. And you get this exclusive combination of advantages: No rectifier needed . . . AC operation. Totally enclosed drive element ideal for hazardous, dusty, wet and corrosive installations. New fibre glass springs assure superior performance and control . . . longer life because spring breakage is practically eliminated.

The full line of Eriez Hi-Vi vibratory feeders includes models with feeding capacities ranging from ounces to many tons per hours.

Write for descriptive bulletin to:

ERIEZ MANUFACTURING CO.
73 PB Magnet Drive, Erie, Pa.



MAGNA-THOUGHT
Constant research, development and refinement are the keys to new and improved products. New and improved products are the keys to a company's growth.

A. F. Israelson
A. F. ISRAELSON
Chief Engineer



A GROWTH COMPANY...
10 NEW PRODUCTS IN THE LAST 5 YEARS

Check 2554 opposite last page.

CHEMICAL PROCESSING

THAT'S
INTERESTING

**Harnessing
the tides**

Power is being produced commercially on a continuous basis by a hydroelectric generating unit at Saint-Malo, France.

Designed for alternate operation as turbine or pump, unit variously performs as turbogenerator between head-storage basin and sea, between sea and basin, and as electro-pump in the same two directions of flow. Thus, whether tide is coming in or going out, it is always possible to generate power to meet peak-load demands.

System also stores up power for later use. Compact unit is less expensive to build.

For more information on product at right, specify 2555 see information request blank opposite last page.



The J & L galvanized pail, left rear, is used to safely ship and store Federal Grenades and Spedeheat Projectiles shown.

Last year in Bombay

The gentleman fondling the tear gas grenade is Mr. W. H. Durno, Federal Laboratories, Inc., Saltsburg, Pa. Last year in Bombay, India, he saw for himself what the monsoon season does to most packaging. And he saw how J & L galvanized steel pails keep his products in perfect condition, despite two years of storage, two monsoon seasons of 110°-120° F. heat and near 100% humidity.

In Bombay, Mr. Durno inspected two lots of Federal tear gas projectiles. Each lot was over two years old. Lot #1 was stored in Federal's old-style scrimback-carton-and-wood-crate packaging. Indian officials had opened the packages to inspect and date-mark the projectiles. Heat and humidity had corroded the paint off the projectiles so that they were leaking gas and were too rusty to use in riot guns.

Pails give full protection: Lot #2 was a different story. The projectiles were factory-perfect, ready for instant use. The J & L galvanized steel pails, like the scrimback packaging, had been opened for inspection and date-marking of projectiles. But when closed again, the J & L pails still gave the tear gas projectiles full protection against heat and humidity.

Pails are easy to pack: Federal packs, in each J & L pail, 16 tear gas grenades, or 28 large barricade shells, or 22 smaller riot shells. Each grenade or shell is sealed in an individual carton, then nested inside a J & L pail, as pictured right. Compared to the complicated packaging used before, *J & L pails cut Federal's packing time in half.*

It may be that J & L steel drums and pails can save you time and money, too—or help protect your product in shipment and storage—or create a new source of customer good will. Talk containers with your J & L representative soon. Or write to *Jones & Laughlin Steel Corporation, Container Division, 3 Gateway Center, Pittsburgh 30, Pa.* All nine J & L container plants offer you fast service.

Jones & Laughlin Steel Corporation
CONTAINER DIVISION
3 Gateway Center • Pittsburgh 30, Pennsylvania



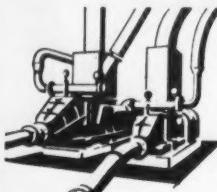
Federal tear gas grenades, fully protected in J & L galvanized pails, are ready for instant use—as demonstrated here on Federal's test range.

This Steelmark identifies quality products made of steel. Look for it when you buy.



FULLER EQUIPMENT

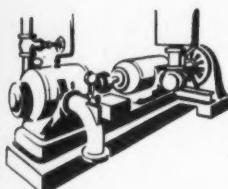
for the process industries



bulk materials pneumatically. Fuller-Kinyon

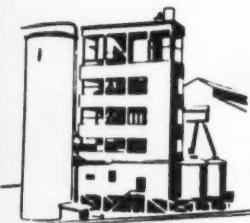
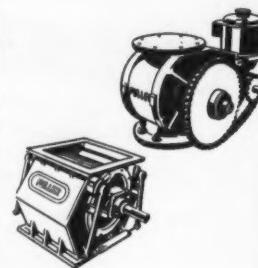
Pneumatic Materials Handling Systems. Widely specified throughout the process industries, Fuller's range of equipment offers best single source for solving problems in moving dry bulk materials pneumatically. Fuller-Kinyon

Pumping Systems, Airveyor® Pressure and Vacuum Conveying Systems, and F-H Airslide® Fluidizing Conveyors are completely sealed to prevent both contamination of the product and any leakage of dust, etc., into the surrounding area. They are used to move dry, granular and pulverized materials to and from cars, ships, trailers, storage and processing points.



Fuller Rotary Compressors and Vacuum Pumps are vibration-free, can be installed anywhere, even on balconies. Fewer moving parts mean minimum maintenance. Compressors and Vacuum Pumps handle air and gases from 30 to 3300 cfm at pressures to 125 lb. gage. Vacuums to 29.95 in. (referred to 30-in. barometer).

Fuller Vane-type and Roll Feeders . . . for volumetrically controlled feeding of a wide range of dry pulverized or granular materials. Also Fuller Rotary Valves . . . used under silo deck slabs and bins to permit the free flow of pulverized materials which tend to arch, such as lime and cement raw materials.



Fuller Preheaters, Humboldt Suspension Type . . . for preheating dry, pulverized Portland cement raw materials with rotary kiln waste gases.

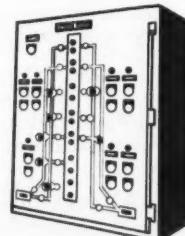
Fuller Horizontal and Inclined Grate Coolers are compact, easily installed for fast, efficient cooling of materials such as nodulized phosphate rock, pebble lime, ores, dolomite, iron nodules and Portland cement clinker from 2800°F. or higher to any desired point within a reasonable range of atmospheric temperature.



Fuller-Material-Level Indicators signal audibly and visibly when materials reach a predetermined high or low level. Controls conveyor motors, valve circuits, etc.

Fuller equipment is designed to help give you maximum efficiency at minimum cost. Send today for more detailed literature.

Fuller Control Panels permit automatic, remote, one-man control of multiple operations. Easily-read panel permits visualizing flow of material to storage or from process bins.



See Chemical Engineering Catalog for details and specifications

FULLER COMPANY

136 Bridge St., Catasauqua, Pa.
Subsidiary of General American Transportation Corporation
Offices in Principal Cities Throughout the World

Fuller

pioneers in harnessing AIR



Check 2556 opposite last page.

HANDLING & PACKAGING

► A NEW SOLUTIONS ARTICLE
Switch to extensible paper cuts bag costs 7% at Shell Chemical

More pliable, lighter bags simplify filling operation

Problem: Because of the stiffness of the heavy weight bags used, operators filling them with fertilizers and polystyrene resins at Shell Chemical Company were frequently required to slap the bags to fully open and fill them.

This often cut off the filling machine with the result that underweight bags had to be opened and "topped" at the inspection station. This situa-



Re-designed extensible paper bag is shown with predecessor

tion also posed the highly undesirable possibility of an underweight bag going out into the field.

Solution: Extensible paper bags were adopted for packaging 65 to 70% of Shell's fertilizers and polystyrene resins.

Ammonium sulfate, tri-superphosphate, ammonium phosphate sulfate and diammonium phosphate are packaged in 80- and 50-lb capacity bags. The polystyrene is packaged in 50-lb bags.

Results: Extensible paper bags used for the fertilizers are three-ply — two plies of 50-lb basis weight and one-ply of 70-lb, for a total basis weight of 170 lb. This compares with the four-ply bags, having a total basis weight of 200 lb, previously used.

Five-ply construction —

HANDLING & PACKAGING

three of 40-lb basis weight and one each of 50- and 60-lb basis weight — are used for packaging polystyrene resins. Total basis weight is 230-lb as compared to 260-lb for the bags previously used.

The reductions in basis weight result in an overall lowering of bag costs by about 7%, an appreciable amount when it is considered that Shell uses hundreds of thousands bags per year.

The more pliable extensible paper bags fill easier, eliminating the "slapping" operation.

(Clupak extensible paper, used in the bags, is manufactured by process licensed by Clupak, Inc., 530 5th Ave., New York 36, New York.)

Check 2557 opposite last page.

For more information on developments in this section, check the Reader Service Slip.

Adhesive for poly-coated bags cuts clean-up

Uses: Adhesive for pasting side seams or bottoms and cross-seaming of multi-wall polyethylene-coated kraft bags.

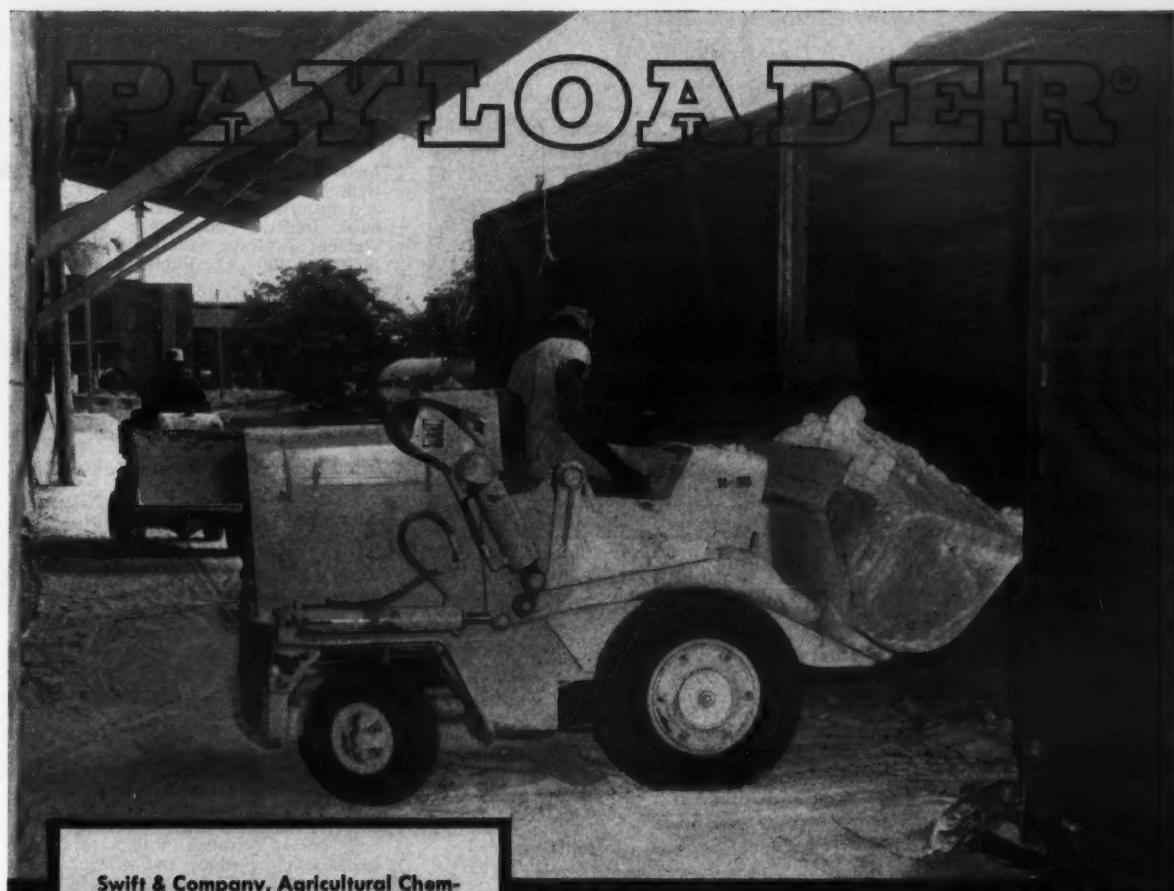
Features: Strong bonds and high mechanical stability allow it to perform without gumming up, coagulating, or building up along sides of glue pot. This reduces downtime for glue pot clean-up operations. Adhesive offers good tack properties.

Description: Modified latex adhesive can be diluted and cleaned with water. Good flexibility of the odorless dry film helps bags withstand rough handling without splitting. Seam strength is also enhanced by moisture resistance of adhesive.

It may be used cold and is available in various viscosities.

(M-P Bag Adhesive 1380 is a product of Morningstar-Paisley, Inc., 630 W. 51st St., New York 19, N.Y.)

Check 2558 opposite last page.



Swift & Company, Agricultural Chemical Division, is one of the oldest and largest of fertilizer manufacturers. It was one of the first chemical companies to use integral-design tractor-shovels as pioneered by The Frank G. Hough Co. some 20 years ago, and has purchased several hundred of these PAYLOADER units. Moreover, the advice, counsel and criticism from Swift personnel have contributed much to the continual improvement of PAYLOADER designs through the years — a fact that the Hough organization appreciates and is glad to acknowledge.

HOUGH

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY - INTERNATIONAL HARVESTER COMPANY

HOUGH, PAYLOADER, PAYMOVER, PAYLOGGER and PAY are registered trademark names of The Frank G. Hough Co., Libertyville, Illinois

Production Protection

Superintendents of fertilizer plants will agree that "dependability" is an important, if not the chief, consideration when they buy mechanical equipment. A mechanical failure anywhere along the line, especially during night-and-day peak-season operations, can be a serious and costly interruption.

Hough engineers know this too, and have designed more production-protection into the Model H-25 PAYLOADER than has ever before been provided in a tractor-shovel. As one plant superintendent testifies, "The maintenance on our two H-25's has been lower than on any loader previously used."

Extraordinary Protection includes two-stage dry-type air cleaner system; cartridge-type oil filters on all three oil systems; sealed, self-adjusting hydraulic service brakes; parking brake enclosed in transmission; special grease and oil seals on all vital points.

Your Hough Distributor will be glad to show you how the H-25's greater-production and lower-maintenance can help "ease the profit squeeze" of your bulk handling.

THE FRANK G. HOUGH CO., 744 Sunnyside Ave., Libertyville, Ill.

Name _____

Title _____

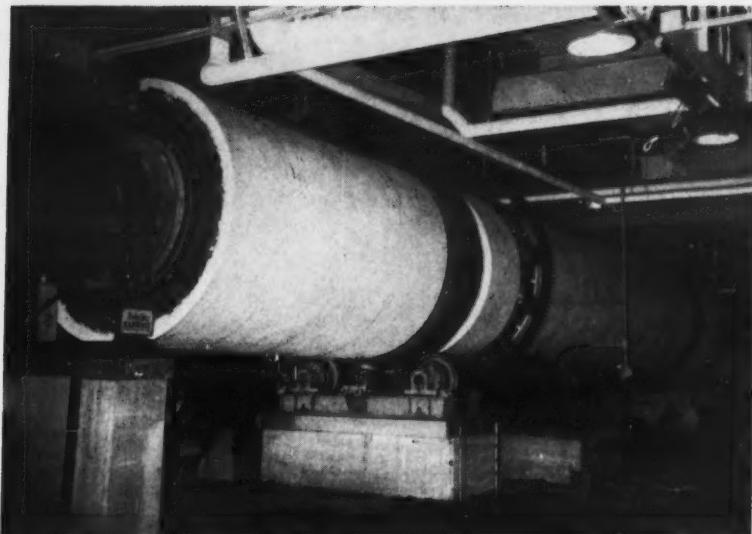
Company _____

Street _____

City _____ State _____

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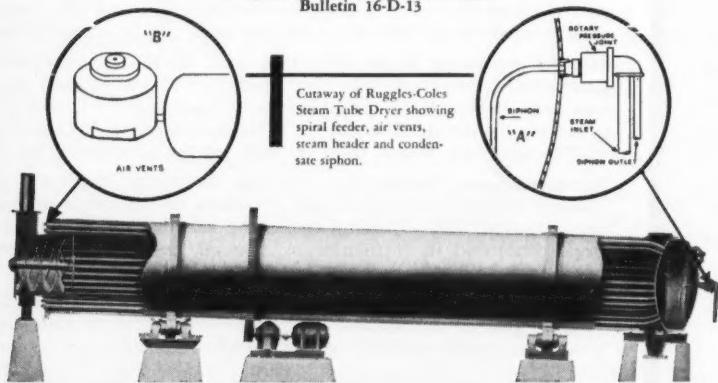
Check 2559 opposite last page.



Ruggles-Coles STEAM TUBE DRYERS

- Ruggles-Coles Steam Tube Dryers have been supplied fabricated of aluminum, nickel, monel, inconel, stainless steels and other alloys to provide protection against corrosion and contamination. All fabrication is to code requirements.
- The continuous siphon discharge of condensate is independent of speed of rotation of the shell. (See "A")
- Automatic air vent for each tube eliminates loss of tube heating surface at the feed end of the dryer. (See "B")
- These extra advantages of the Ruggles-Coles Dryer mean continuous maximum output without operating attention and elaborate control devices.

Complete specifications upon request.
Bulletin 16-D-13



HARDINGE
COMPANY, INCORPORATED

Main Office and Works • 240 Arch St., York, Pa.

"Hardinge Equipment—Built Better to Last Longer."

NEW YORK
TORONTO
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LAKELAND
BIRMINGHAM

Check 2560 opposite last page.

NEW LITERATURE
Material Handling
and Packaging

Inclined-belt conveyors for efficient interfloor handling of goods and materials are covered in six-page folder. Photographs and sketches illustrate typical installations. Bul 400—The Rapids-Standard Co., Inc.

Check 2561 opposite last page.

Gas-tight screw conveyors and accessory equipment are presented in text, photographs, and diagrams of eight-page Bul 83-A—Sprout, Waldron & Co., Inc.

Check 2562 opposite last page.

Packaging machinery, for auger filling, casing, pouch filling and sealing, check weighing, contour wrapping, carton filling, tray forming and setup boxmaking, is subject of four-page Bul P-813—FMC Packaging Machinery Division, Food Machinery and Chemical Corporation.

Check 2563 opposite last page.

Overhead handling of materials is given comprehensive treatment in 12-page booklet which presents up-to-date information on carriers, cranes, tractors, track switches, and grabs. Detailed studies of track design, peening and stresses are given. Bul 2008-Q—Cleveland Tramrail Division, The Cleveland Crane & Engineering Co.

Check 2564 opposite last page.

Heavy-duty trucks and their place in industry is pictorially presented in 12-page Heavy-Duty Trucks Bul—Automatic Transportation Company, division of The Yale & Towne Manufacturing Company. Check 2565 opposite last page.

Strapping methods and tools for improving packaging, unitizing and shipping are described in 40-page Cat 20—Signode Steel Strapping Company.

Check 2566 opposite last page.

Versatile vehicle which runs on rails and on roads is described in a cartoon book that will interest anyone wanting to boost materials handling efficiency. Book doubles as colorful story book for the youngsters. Tricky the Trackmobile Book—Whiting Corporation.

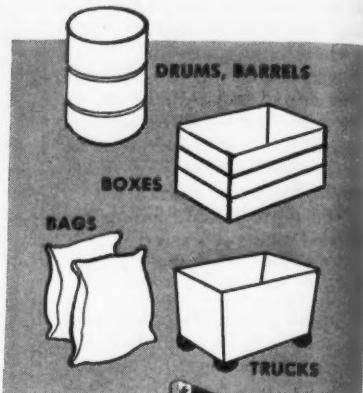
Check 2567 opposite last page.

Liquid filling machine that forms, fills and seals pouch-type containers from roll stock of heat-sealable, flexible packaging materials is described in Bul LF-60—Speedway Machine & Tool Co., Inc.

Check 2568 opposite last page.

the safe,
productive way

to LIFT & DUMP ANY CONTAINER



One of four basic types of CESCO dumpers.

Dumping Heights:
1 ft. to 50 ft.
Capacities:
100 to 5000 lb.



Just push a button, and your CESCO dumper lifts and dumps drums, barrels, bags, boxes, trucks—quickly and safely. You save manual labor, reduce hazards, boost productivity. Look around your plant now to see where CESCO dumpers can save for you. Special dumpers engineered to your requirements.

Send for helpful catalog A-7
describing complete line.



CONVEYORS & DUMPERS, INC.

DIVISION OF MERCURY INDUSTRIES, INC.
P. O. BOX 111, HILLSDALE, NEW JERSEY

COLSON EQUIPMENT & SUPPLY CO.
1317 Willow Street, Los Angeles 13, Calif.

Check 2569 opposite last page.

CHEMICAL PROCESSING

HANDLING & PACKAGING

Conveyor belting, including rubber and neoprene, white cotton, glazed, wire and rod, is covered in Belt-Cat — Burrell Belting Co.

Check 2570 opposite last page.

Centrifugal thrower units for loading and piling of grain, sand or other granular, small lump bulk materials are treated in pictures, graphs, and text in Bul 460 — Standard Products Division, Stephens-Adamson Mfg. Co.

Check 2571 opposite last page.

High-stacking, ton-capacity walkie with built-in charger is introduced in six-page Bul 34-K—Lewis-Shepard Products, Inc., Dept. R10-61.

Check 2572 opposite last page.

Void case ejector which can be used to inspect either open or sealed cases of cans or metal-cap jars or bottles, is described in Ejector Cat — Peco Corporation.

Check 2573 opposite last page.

Magnetic grates are cataloged and case histories of users' actual experiences given in six-page Brochure B-44—Eriez Manufacturing Company.

Check 2574 opposite last page.

Batch weighing systems, both manual and automatic electric, are covered in 20-page Bul B-100 — Gilmore Industries, Inc.

Check 2575 opposite last page.

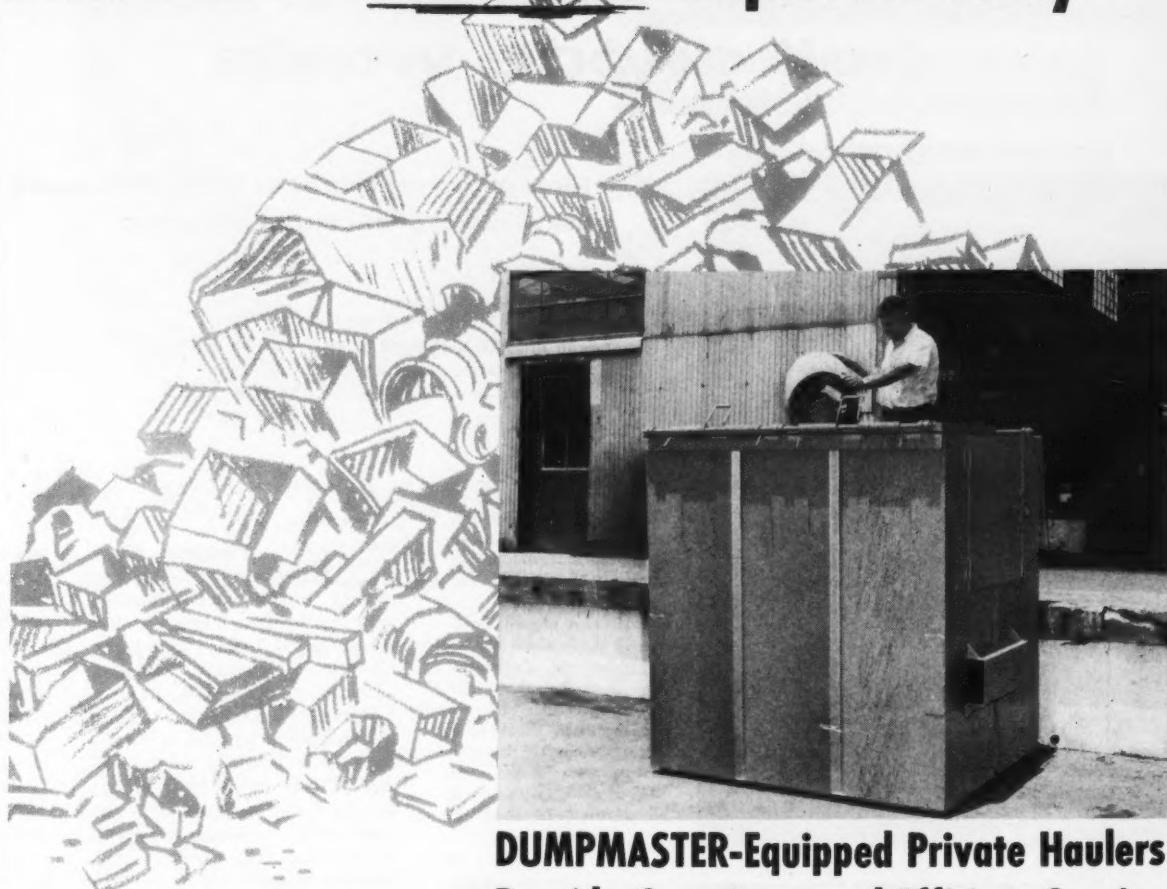
Dock plates which are capable of handling rolling loads up to 6000 lb are cataloged in Bul TLP-460 — Magline Inc.

Check 2576 opposite last page.

Unit packager which is adjustable for wrapping items of different sizes at high speed, is subject of UPCA Cat — Wrap-Ade Machine Co. Inc.

Check 2577 opposite last page.

NOW! You Can End Refuse Storage Problems... WITHOUT Capital Outlay



DUMPMASTER-Equipped Private Haulers Provide Containers and Efficient Service

If you're plagued with trash piles, scattered refuse, fire hazards, and hit-or-miss collection, there's a good chance you can do something about it . . . WITHOUT CAPITAL OUTLAY!

In most major cities DEMPSTER-DUMPMaster-equipped private haulers will put clean, big-capacity storage containers at convenient locations in your plant . . . empty them mechanically on schedule, or on a call-in basis . . . all for a reasonable monthly fee.

When you containerize your refuse, plant housekeeping becomes easy, employee morale goes up.

Write today for the name of your nearest private hauler. We'll also send literature describing his service.



IN ALL LEADING CITIES
FROM COAST TO COAST



"Aha, just as I thought!"

Write Today for
Free Brochure and Name of Nearest Private Hauler
DEMPSSTER BROTHERS
Inc.

Dept. CP-2 KNOXVILLE 17, TENNESSEE

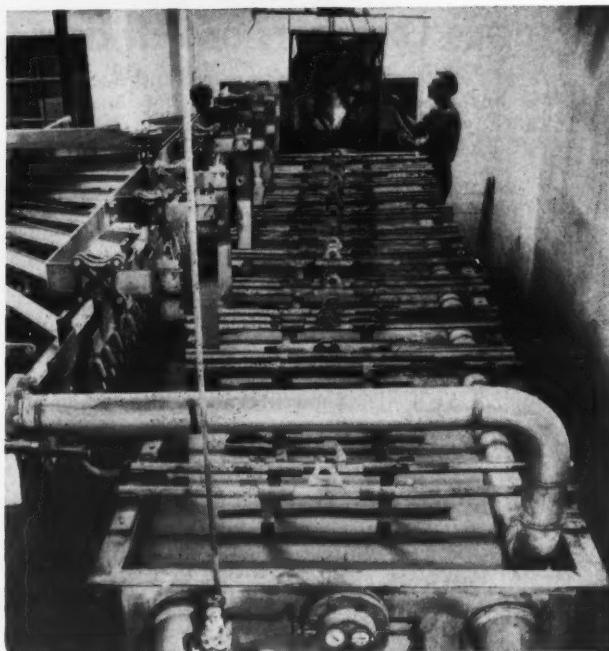
Check 2578 opposite last page.

Titanium 'scrap' baskets halt anode waste



Titanium basket filled with anode remnants ready to be put into electrolytic cell

Overall view of cell. Foreground shows nickel anodes suspended in electrolyte. Tops must be above the corrosive solution to avoid decomposition of supporting straps. Before titanium baskets were used, 7 to 10% of each anode had to be diverted to scrap or other use.



High-price metal earns its keep; units assure 100% use of nickel plates in catalyst plant

TED F. MEINHOLD, Associate Editor
with CHESTER L. PEDIGO, Engineering Coordinator,
Girdler Catalysts, Chemical Products Division
Chemetron Corporation, Louisville, Kentucky

A
NEW SOLUTIONS
FEATURE

Problem: Inability to completely utilize nickel anodes was resulting in excess nickel scrap at Girdler Catalysts, Chemical Products Division, Chemetron Corporation, Louisville, Kentucky. Used in electrolytic process for making hydrogenation catalysts, the refined nickel plates could not be fully submerged in the electrolyte solution without destroying the anode's supporting straps.

The unused ends amounted to about 7-10% of the anode's initial weight. If sold as scrap, this metal would yield considerably less than the 75 cents per lb initially paid for it. With tonnage quantities involved, investment costs were quite high.

Solution: When the plant started up its new electrolytic cell a few months ago, it included provision for the use of large titanium baskets. Anode remnants can be placed in the containers which are then completely suspended in the electrolyte until scraps have been fully consumed. The baskets are made of commercially pure titanium capable of withstanding the severely corrosive environment.

The electrolyte used in the process is circulated through the cell at approximately 40 psi and 300 gpm by a stain-

less-steel centrifugal pump. Automatic instruments control pH, which is kept basic.

The electrolytic process forms nickel hydroxide which serves as intermediate for manufacturing two reduced nickel hydrogenation catalysts — G-15, a selective catalyst used in processing oils, and G-49A, a highly active, non-pyrolytic catalyst useful for hydrogenating liquid organics.

As anodes corrode, finely divided particles of nickel are electrolytically deposited on the kieselguhr support suspended in the electrolyte. Voltage for process is kept at six to nine volts and is supplied by water-cooled silicon rectifier equipped with constant amperage control. Process is timed and controlled to give specific ratio of nickel to carrier and to assure a highly uniform product.

When deposition of nickel is complete, slurry (containing about 5% solids) is filtered to remove the electrolyte. Collected solids are then washed, dried or calcined and ground to a fine powdered product in suitable equipment.

Process pipe and fittings are welded, light-wall stainless steel, selected for corrosion resistance and moderate pressure and temperature conditions.

Results: The titanium bas-

kets enable Girdler Catalysts to achieve virtually 100% utilization of nickel plate anodes — eliminating the 7-10% waste previously encountered. Although containers were expensive they are more than earning their keep, justifying the plant's initial investment. The baskets are not affected by the corrosive conditions existing in the cell, assure product purity and are expected to last indefinitely.

(Titanium baskets were fabricated by Plating Products Company, Kokomo, Indiana.)

Check 2579 opposite last page.

(Further information about hydrogenation catalysts may be obtained from Girdler Catalysts, Chemical Products Division, Chemetron Corporation, P. O. Box 337, Louisville 1, Kentucky.)

Check 2580 opposite last page.

**Practical solution
for tough service:
bi-metallic pipe**

Lining technique widens use
of costly alloys

Uses: Handling various corrosives in chemical and allied industries.

Features: Choice of corrosion-resistant metals is virtually unlimited. Usually, the face pipe is standard carbon steel. Linings include Monel, nickel, stainless steel or numerous other alloys.

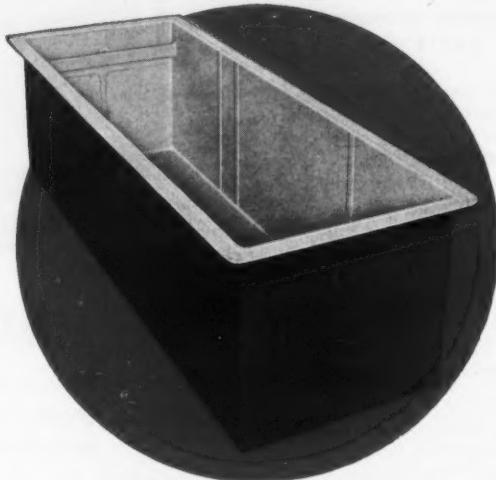
Description: Pipe consists of a seamless lining hydraulically expanded inside the base pipe. Product has fabrication and strength advantages of a carbon steel system, combined with corrosion resistance of the more expensive alloy materials. Cost is considerably lower than solid alloy pipe.

The bi-metallic pipe can be butt-welded, flanged and bent without damage to lining or bond between lining and base material.

(Bi-metallic pipe is product of Grayloc Sales Division, Gray Tool Company, P. O. Box 2291, Houston 1, Texas.)

Check 2581 opposite last page.

Whatever your requirements as to-



OPERATING TEMPERATURE

CHEMICAL RESISTANCE

ABRASION RESISTANCE

**FREEDOM FROM
CONTAMINATION**

There's a

"U. S." TANK LINING TO MEET YOUR MOST CRITICAL NEEDS!

Because The U. S. Stoneware Company produces a line of tank lining materials to meet virtually any operating requirement, you can be sure of getting a lining that will give a long, trouble-free service life . . . without paying for protection you don't need.

Among the most widely used "U. S." tank lining materials are:

TYGON® — A modified polyvinyl chloride sheeting, made by extruding rather than by calendering. Outstanding general chemical resistance up to 165° F. Non-contaminating smooth, tough, abrasion-resistant, non-aging.

PENTON* — A chlorinated polyether extruded lining, resistant to virtually all organic and inorganic agents, which fills the temperature gap between polyvinyl chloride and fluorocarbon. Withstands all inorganic acids except fuming nitric and fuming sulfuric. Physically, PENTON is tough, strong, shows outstanding dimensional stability.

WHICH LINING MATERIAL?

If you're in doubt as to which lining is best for your particular needs, simply write us a letter describing the operation. A "U. S." Tank Lining Specialist will be glad to make suggestions and recommendations — without cost or obligation.

KEL-F** — Trifluorochlorethylene plastic which is completely inert to corrosives of all types. Temperature range extends from -100° F. to 350° F.—higher with an acid brick oversheathing serving as a temperature gradient. Non-contaminating.

RESILON — A depolymerized rubber-and-resin-based thermoplastic available either plain or fiberglass-reinforced. Easily applied with a minimum of equipment. Suitable for a variety of mild corrosive conditions.

These and other linings produced by The U. S. Stoneware Company are installed by factory-trained, fully experienced applicators located throughout North America.

Write today for complete
information on "U. S."
Tank Linings.



*Registered Trade Mark, Hercules Powder Co.

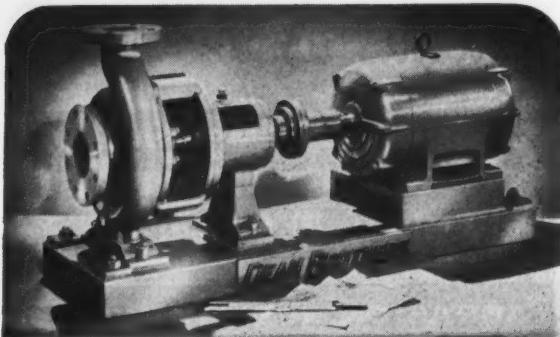
**Registered Trade Mark, 3M Co.

PLASTICS & SYNTHETICS DIVISION



U. S. STONEWARE
AKRON 9, OHIO

Check 2582 opposite last page.



**FOR EASE IN SOLVING CORROSION PROBLEMS
CHECK THE 4 E's OF
DEAN BROTHERS TYPE pH PUMPS**

- ✓ Easy to Select—28 sizes (14 horizontal, 14 vertical) available in 14 corrosion-resistant alloys, to fit your special pumping problem.
- ✓ Economical to Buy—Low first cost combined with easy servicing and maximum interchangeability of parts make pH pumps lowest cost in the long run.
- ✓ Easy to Install—Centerline suction and discharge connections. No need to remove from suction or discharge piping for servicing.
- ✓ Economical to Operate—Fully open impellers for slurries and clear liquids contribute to long, trouble-free service life with minimum down-time.

For Complete Information Write for Circular 217

DEAN BROTHERS PUMPS INC.
INDIANAPOLIS 7, INDIANA

The Best Is Our Standard

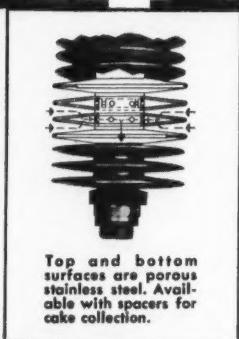
Check 2583 opposite last page.

Maximum filter surface in minimum volume

SMX

SURFAMAX
all stainless steel
FILTERS

- Cleanable—easy to service
- Corrosion-resistant
- Low pressure drop
- For -360 F. to 900 F.
- 0.1 to 1000 gpm



Top and bottom surfaces are porous stainless steel. Available with spacers for cake collection.

Stock or custom orders
SEND FOR FREE CATALOG

MICRO METALLIC

A Division of **PALL Corporation**

30 Sea Cliff Ave., Glen Cove, N.Y.

Check 2584 opposite last page.

CORROSION CONTROL

Polyethylene pump handles corrosives at 240°F

Uses: Transferring corrosive fluids at temperatures up to 240°F.

Features: Units are available with capacities from 1/3 to 40 gpm.

Description: Pump has no stuffing boxes or shaft seals. Danger of leakage or of product becoming contaminated through stuffing boxes or seals is bypassed. Variety of power drives are available.

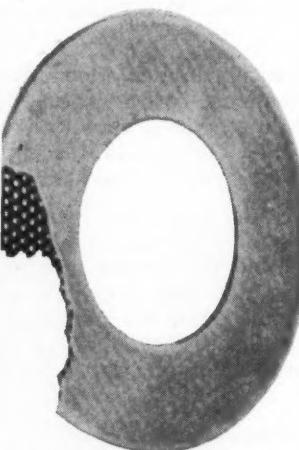
(Polyethylene pumps are product of Vanton Pump and Equipment Corporation, Hillside, New Jersey.)

Check 2585 opposite last page.

Teflon-steel knit gasket will not cold flow

Provides corrosion-resistant, tight joint

Uses: For gaskets used with pipeline flanges, valves, pumps and other applications involving acids, caustic, solvents and



Teflon and steel are knit together to form a strong, corrosion-resistant, resilient gasket

other hard-to-hold liquids.

Features: It has not always been possible to use the excellent properties of Teflon to maximum advantage in gasketing due to material's tendency to cold flow. This reinforced Teflon gasket over-



PLATECOIL®

boosts efficiency in all kinds of tank and process heating and cooling — saves on engineering, fabrication and maintenance

PLATECOIL can be engineered and factory-fabricated to exact specifications. Available in a wide range of standard sizes, specially formed or fabricated units, and most weldable metals. Operating pressures up to 250 psig.

WRITE FOR NEW BULLETIN P54

PLATECOIL DIVISION, TRANTER MANUFACTURING, Inc.
Lansing 9, Michigan

Check 2586 opposite last page.

**Specify this better
Corrosion-Resistant Mortar**



for Floors, Sewers,
Processing Vessels,
Chimneys and other
Masonry Installations

Sauereisen Resin Cement No. 40 has excellent adhesion to acid brick and tile, withstanding acids, alkalies, foods, oils, water and steam. Ask for Data Sheets.

Sauereisen Cements Co., Pittsburgh 15, Pa.

SAUEREISEN RESIN CEMENT No. 40

Check 2587 opposite last page.

CHEMICAL PROCESSING

CORROSION CONTROL

comes this limitation. Gasket will withstand 20,000 psi static pressure.

Description: Gasket is made by molding Teflon around a perforated steel disk. Hundreds of tiny holes in disk provide retaining areas for Teflon and prevent creeping and cold flow. Gasket is strong and resilient. It is easy to install, reusable and will not blow out. Sizes from 1 to 4" are available. Larger sizes will be produced soon.

(Task-Line gasket is product of The Duriron Company, Inc., 450 Findlay St., Dayton, Ohio.)

Check 2588 opposite last page.

Pump shaft couplings are made of Teflon, stainless steel

Resist corrosion, never need external lubrication

Uses: Shaft couplings for pumps handling corrosive liquids.

Features: Couplings are made of 316 stainless-steel and glass-reinforced Teflon. No external lubrication is necessary.

Description: Chemical-resistant, flexible couplings are designed for applications where leakage along pump shaft or chemical atmospheres cause deterioration of conventional coupling materials. Units are available in four sizes ranging from 5/16 to 3/4 inch.

Serrated coupling halves are stainless steel castings. Shock-cushioning, self-lubricated spider is molded from glass-reinforced Teflon.

Self-aligning, the stainless steel-Teflon combination compensates for mismatch, misalignment and end movement of shaft within reasonable limits. The Teflon also acts as electronic barrier, preventing passage of stray currents between drive and pump.

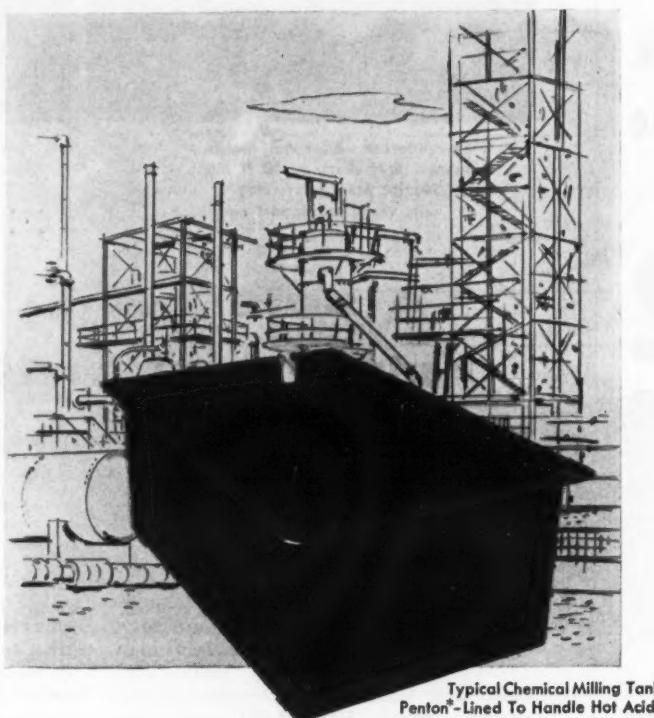
(Stainless-steel and Teflon pump shaft couplings are product of Eco Engineering Company, 12 New York Ave., Newark 1, N. J.)

Check 2589 opposite last page.



GAR-LINE PENTON TANK LININGS

for Corrosion Resistant Service



New GAR-LINE Penton Tank Linings offer economical, high-temperature protection against corrosion. Where only more expensive materials were previously used, GAR-LINE Penton Tank Linings are proving their ability to perform as well as—and better—in many corrosive exposures at high temperatures.

Unique Properties. Mechanically, GAR-LINE Penton Tank Linings exhibit excellent tensile strength at high temperatures, good dimensional stability and low water absorption . . . Chemically, they resist all inorganic acids except fuming nitric and fuming sulfuric.

Applied by these carefully selected and authorized applicators:

ABRASION & CORROSION ENGRS. 1205 N. McMasters Street Amarillo, Texas	GOODALL RUBBER COMPANY 2050 N. Hawthorne Avenue Melrose Park, Illinois
AUTOMOTIVE RUBBER CO., INC. 12580 Beech Road Detroit 39, Michigan	HANSZEN PLASTICS COMPANY 835 S. Good-Latimer Expressway Dallas, Texas
BARTHEL CHEMICAL CONST. CO., INC. P.O. Box 1025 Tacoma 1, Washington	HEIL PROCESS EQUIPMENT CORP. 12901 Elmwood Avenue Cleveland 11, Ohio
BELKE MFG. CO., INC. 947 N. Cicero Avenue Chicago 51, Illinois	HUNTINGTON RUBBER MILLS OF PORT COQUITLAM B.C., Canada
BITTNER INDUSTRIES, INC. 91 Diaz Street P.O. Box 10265 Prichard, Alabama	INNER-TANK LINING CORP. 4777 Eastern Avenue Cincinnati 26, Ohio
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BUFFALO LINING & FABRICATING CORP. 73 Gillette Avenue Buffalo 14, New York	MERCER RUBBER CORPORATION Highway 46, Cor. Huyler Little Ferry, New Jersey
CHEMICAL PROOF OF SEATTLE 625 Alaska Avenue Seattle, Washington	METALWELD, INC. Scott Lane & Abbottsford Rd. Philadelphia 29, Pennsylvania
CORROSION TREATMENT CORP. P.O. Box 125 Byesville, Ohio	PARKER BROTHERS, INC. 7044 Bandini Blvd. Los Angeles 22, California
ELCHEM ENGRG. & MFG. LTD. P.O. Box 249 Burlington, Ontario, Canada	PLASTICS APPLICATORS, INC. 7020 Katy Rd. P.O. Box 7631 Houston 7, Texas
ELECTRO CHEMICAL ENGRG. & MFG. CO. 750 Broad Street Emmaus, Pennsylvania	PROTECTIVE COATINGS 1602 Birchwood Avenue Ft. Wayne, Indiana
FLORIDA CORROSION CONTROL 2939 W. Beaver Street P.O. Box 10082 Jacksonville 7, Fla.	RUBBER ENGINEERING & MFG. CO. P.O. Box 2335 Salt Lake City 10, Utah
THE FORTUNE COMPANY 1100 W. 37th St. North Wichita 4, Kansas	RUBBER MILLERS, INC. 707 S. Caton Avenue Baltimore, Maryland
GALIGHER COMPANY 545 West 8th—South Salt Lake City, Utah	ST. LOUIS METALLIZING CO. 625 S. Sarah Street St. Louis 10, Missouri
GOLDEN PLASTICS CORP. 333 East 8th St. Oakland 6, California	STEBBINS ENGRG. & MFG. COMPANY Watertown, New York

GARLOCK

For more information, contact the applicator nearest to you. Or, write for data on Penton; information also available on Teflon Anti-Stick and Teflon® Tank Linings. Special Products Dept., Garlock Inc., P.O. Box 612, Camden 1, New Jersey.

*Registered Trademark, Hercules Powder Company

†Registered Trademark, The DuPont Company

Check 2590 opposite last page.



2 year round-the-clock protection against sulfuric acid spill and splash

GACO H-2 HYPALON COATING

Problem: A large Canadian manufacturer had a problem transporting sulfuric acid at 200°F. in its tank trucks from the pickling line to a disposal dump. The fleet of tank trucks must operate around the clock—and the best "acid proof" paint available would last for *only one trip* and then peel off.

Solution: The exteriors of the tank trucks were coated with GACO H-2 Hypalon as a protection against the continual splashing and spillage of acid during loading and unloading.

Result: This coating has now been in service over a full *two years*, with trucks running around the clock, and *shows no signs of deterioration*. GACO liquid Hypalon Coatings start work where ordinary coatings fail. For further information, write—we'll forward literature of interest.

GATES ENGINEERING CO.



WILMINGTON 99, DELAWARE
GACOTE, NEOPRENE*, HYPALON,
VINYL, EPOXY, URETHANE

*Sheet and liquid

Check 2591 opposite last page.

CORROSION CONTROL



Glass-reinforced bisphenol polyester tank measures 10 ft diam by 10 ft high, weighs only 3900 lb. Steel reinforcing on top permits vessel to support agitator



Open view of tank shows plastic brackets which hold 18,000 lb lead-pipe steam coil installed after this picture was taken

A safe bet to pay out six times in 10 years

Glass-reinforced plastic tank handles hot, corrosive acid mixtures; provides cure for costly maintenance-downtime dilemma

A
NEW SOLUTIONS
FEATURE

Problem: Maintenance and upkeep costs were excessively high for large metal-lined steel tank handling hot, corrosive acid mixture (dilute HCl, H₂SO₄, and other ingredients) at one of the plants of a major chemical manufacturer. Over a five-year period, repair costs for the vessel equaled its original purchase price.

To make matters worse, substantial loss of production was experienced every time the tank had to be repaired. The entire process had to be shut down and the vessel drained and aired before maintenance work could proceed.

A crew of men would then enter the tank, burn and scrape away damaged areas, and replace them with new metal. The burning operation also constituted a fire hazard.

Solution: The metal unit was replaced by a glass-reinforced plastic vessel. Resin selected was a patented bisphenol-A polyester manufactured by Atlas Powder Company.

Choice of resin was influenced by fact that the structural material had to withstand rapid changes in temperature while

supporting 18,000 lb of lead pipe used for carrying steam for heating—a load more than four times weight of the tank itself. Process calls for variations between 40 to 180°F in an eight-hour cycle. Plant operates three cycles per day.

Overall dimensions of tank are 10-ft diameter by 10-ft high. Wall sections are only $\frac{3}{8}$ to $\frac{5}{8}$ inches thick. Top of vessel is steel-reinforced to permit it to support an agitator. The empty tank weighs 3900 lb—approximately one-quarter that of its predecessor.

Results: The plastic tank is expected to serve for at least 10 years without requiring any major repair. Its initial cost was only about half that of the metal vessel. Total savings during the 10-year period are expected to add up to six times the original price of the vessel. Bonus profits are already being realized by the increase in production resulting from sharp reduction of downtime formerly experienced.

Even when repairs become necessary, the majority of them can probably be made without requiring shutdown. A minor leak can be quickly stopped by a temporary plastic patch on outside of tank surface. This permits plant to continue

PROOF FROM LATEST COST ANALYSIS:

Fluoroflex pipe (lined with Teflon) cheaper in installed cost than glass-lined or high-alloy steel pipe!

to operate until next regularly scheduled downtown period, at which time a permanent patch can be applied to inside of unit.

(Tank was fabricated by Carl N. Beetle Plastics Corporation, a subsidiary of Crompton & Knowles Corporation, Fall River, Massachusetts.)

Check 2592 opposite last page.

(Further information about Atlac-382 polyester resin may be obtained from Chemicals Division, Atlas Powder Co., Wilmington, Delaware.)

Check 2593 opposite last page.

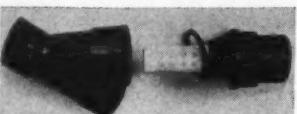
Acids up to 180°F opposed by plastic pipeline strainers

Polypropylene units are strong, lightweight

Uses: Removing foreign particles from corrosive fluids which are at temperatures up to 185°F.

Features: Strainers are made of polypropylene. Units have high strength and good chemical resistance.

Description. Polypropylene device is designed to trap foreign particles and other solids that might be injurious



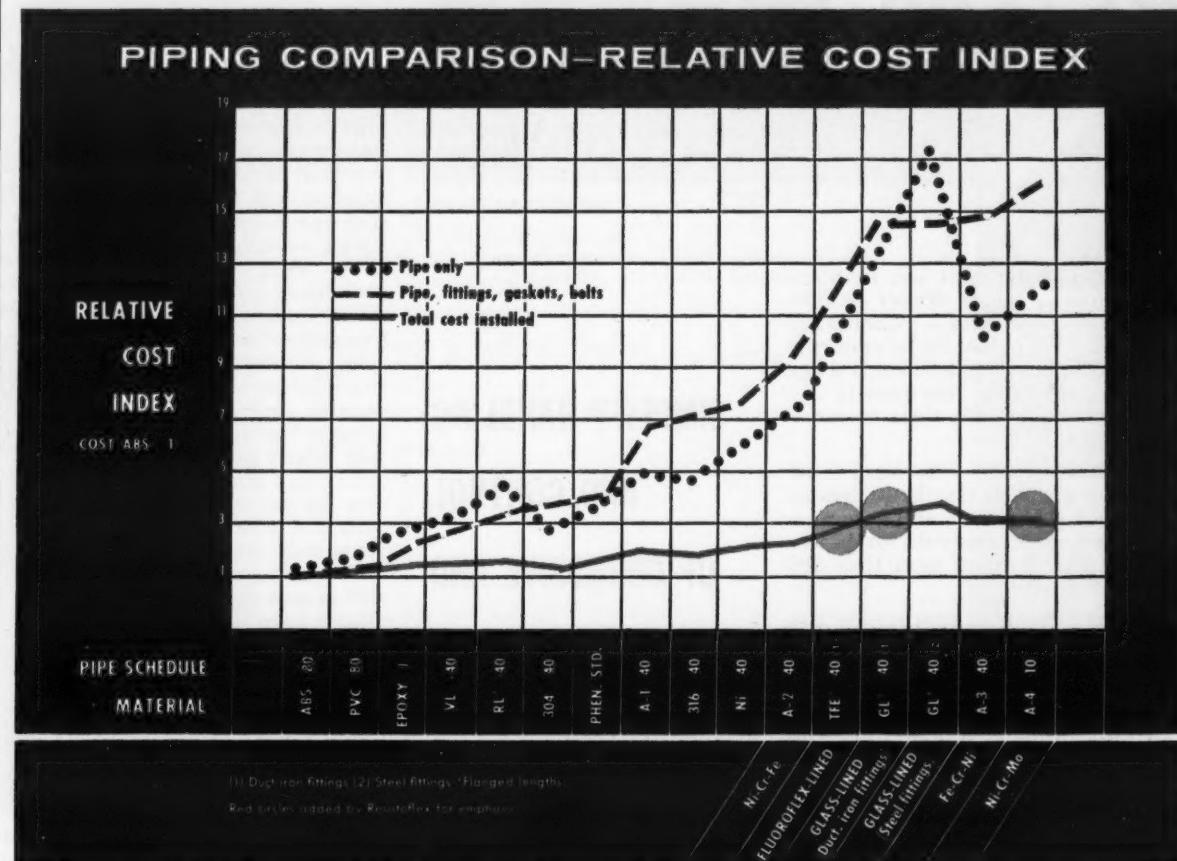
Polypropylene strainers can be quickly disassembled

to moving parts of process equipment. Strainers can be installed directly in pipeline or in equipment.

Units are available in sizes $\frac{1}{2}$ " through 2" diam with molded thread or socket weld ends. Strainer element can be easily removed for cleaning or replacement.

(Polypropylene strainers are product of Vanton Pump & Equipment Corporation, Hillside, N. J.)

Check 2594 opposite last page.



This chart from new documented study tells the whole story:

Here's a report that's going to influence design thinking profoundly! It demonstrates that steel pipe lined with Teflon†, though at present more costly on a material basis, is comparable in installed cost with 316 stainless steel, and actually *cheaper* in installed cost than glass-lined pipe or high-alloy steel! (See chart above; complete figures available from Resistoflex).

Fluoroflex*, the proprietary product manufactured solely by Resistoflex, is fabricated Teflon at its best. Fluoroflex-lined steel pipe, because of its long service life, freedom from corrosion, contamination, and product loss, is actually replacing glass-lined, nickel alloy, and other corrosion-resistant piping materials.

It is at present being used in the manufacture of synthetic

plastics, acrylics, polyethylene, polypropylene, styrene, rayon, and other materials necessitating high-corrosion processes. Because inner surfaces are non-contaminating, Fluoroflex-lined pipe is also ideally suited to the handling of high-purity and sanitary products.

If you are planning a corrosion-resistant piping installation, can you afford to overlook economic facts like this? Write to Resistoflex Corporation for your copy of the complete analysis, today. Plants in ROSELAND, N. J., Anaheim, Calif., Dallas, Tex. Sales offices in major cities.

†DuPont T.M. *Resistoflex T.M.

RESISTOFLEX

COMPLETE SYSTEMS FOR CORROSION SERVICE

FOR MORE FACTS VISIT US AT THE

AICHE SHOW, BOOTH 416 • New Orleans, Feb. 26 to Mar. 1 • NACE SHOW, BOOTH 94-95 • Buffalo, Mar. 14

Check 2595 opposite last page.

NIAGARA METERS

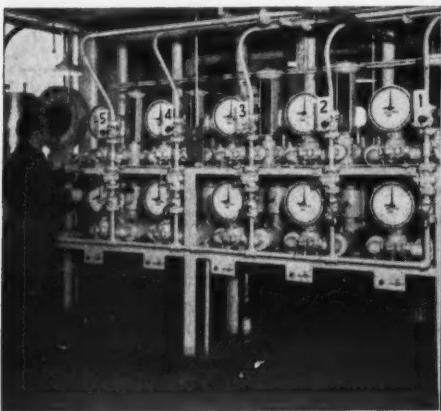


STAINLESS STEEL — Meters available in $\frac{3}{4}$ " to $2\frac{1}{2}$ " size for liquid flows of 1 gpm to as high as 160 gpm. Internal parts of stainless steel or other corrosion resistant materials. Choice of registers and automatic control features.

Whatever liquids you use in plant operations — from Water to Solvents to Sulfuric Acid — chances are there's a NIAGARA Meter specially designed to measure and control the flow . . . safely . . . accurately . . . with savings to you in time, material and labor.

Hundreds of plants—chemical, food, soap, paper, drug, textile — depend on NIAGARA Meters and accompanying automatic controls for batching and processing of more than 500 different liquids.

Leading chemical companies use NIAGARA meters in processing operations to measure and control flow of liquids. Metering assures uniform quality, provides inventory controls, speeds operations and permits safe handling of hazardous liquids.



BRONZE or GALVANIZED IRON — Meters offer widest selection of measurement units and controls from $\frac{1}{2}$ " to 6" size. Handle flows of $\frac{1}{2}$ gpm to 1000 gpm depending on viscosity and type of liquid. Working parts of bronze.

For Complete details, write for Bulletin 48

Subsidiary
of
American
Meter
Company

BUFFALO METER COMPANY, INC.

Dept. CP, 2917 Main Street • Buffalo 14, N.Y.

SALES REPRESENTATIVES THROUGHOUT THE NATION

Check 2596 opposite last page.

CORROSION CONTROL

► A NEW SOLUTIONS ARTICLE

**H_2SiF_6 , H_2SO_4 mist
no strain on plastic
vent system**

Installed 18 months ago in
fertilizer plant

Fumes of fluorine and weak sulfuric acid mist at 100°F, are successfully being resisted by conveyor housing and ventilating system fabricated from glass-reinforced, plastic. Installed nearly 18 months ago at a triple superphosphate granulation plant, the equipment continues to provide trouble-free service.

The conveyor housing is a semi-circular hood with removable covers. Openings located in top at regular intervals receive granulated product from chutes suspended over the conveyor. Unit transports the crushed, superphosphate rock containing sulfuric acid, fluorine (as fluosilicic acid in mist form) and carbon dioxide from the manufacturing process to other plant areas.

Gas exhaust hoods are located at ends of conveyor. These connect to ventilating ducts that remove the corrosive gases and send them to a tetrafluoride fume scrubber on the site.

In addition to economies in initial cost, the glass-reinforced, plastic equipment requires relatively little support. This is due to its light weight, and high tensile and impact strengths. Depending upon composition, tensile strengths range from 11,000 to 15,000 psi. Flexural strengths average 20,000 to 30,000 psi.

(Series 6400 Duracor, from which this equipment was fabricated, is produced by the Ceilcote Company, 4832 Ridge Road, Cleveland 9, Ohio.)

Check 2597 opposite last page.

You could have
paid the last bill
for pipe corrosion
25 years ago . . .

There are many PYREX® glass pipe installations that old and older—corrosive installations—which are still as smooth, clean and serviceable as they were the day they were first put to work.

Take a moment to estimate roughly what pipe corrosion costs you. With PYREX glass pipe, the difference can be as lopsided as 100%. Here's why:



PYREX pipe is resistant to more acids and acidic materials than any other pipe. It delivers even the most active of acids without a trace of corrosion.

Problems of side reaction, pickup, and contamination are practically nonexistent—even at temperatures up to 450°F.

How much could you save in the next 25 years if you never had to replace a corroded pipe?

Bulletin PE-3 has all the facts. It's yours for the asking.



CORNING GLASS WORKS
2902 Crystal Street, Corning, New York

CORNING MEANS RESEARCH IN GLASS

Please send me Bulletin PE-3, PYREX Brand

"Double-Tough" Glass Pipe and Fittings.

Name.....

Title.....

Company.....

Address.....

City..... Zone..... State.....

For more information on development reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Check 2598 opposite last page.

AMERICA'S LEADING MANUFACTURERS, PROCESSORS
AND LABORATORIES ACCLAIM THE **DOUBLE-SEAL**
GUARANTEED SAFETY & PROTECTED EFFICIENCY OF

PROTECTIVE'S PLASTIC LINERS

FOR STEEL DRUMS. FIBRE CONTAINERS, CARTONS AND BOXES
ALL SIZES! ALL STYLES! POLYETHYLENE AND ALL FLEXIBLE FILMS



"DOUBLE WELD" POWER SEAL*
(ROUND BOTTOM)

"TWIN SURE" DOUBLE SEAL*
(STRAIGHT BOTTOM)

Send "FACTS and FIGURES" MANUAL

Please send us prices and information on:

DRUM LINERS

Round Bottom
("Power seal")

Straight Bottom
("Twin sure seal")

Drum I.D. Drum Hgt. Quantity

Material packaged is—Solid Semi solid Liquid

CARTON LINERS

Carton size is—L x W x H

Material packaged is—Solid Semi solid Liquid

BAGS

Bag size required is—W x L

Material packaged is—Solid Semi solid Liquid

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SAFETY IS AN EXCLUSIVE
FEATURE ONLY WITH PROTE

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PROTECTIVE LINING CORP.

601-39TH ST., BROOKLYN 32, N.Y. - ULLSTER 4-3838

For more information on product at left, specify 2599 . . . see information request blank opposite last page.

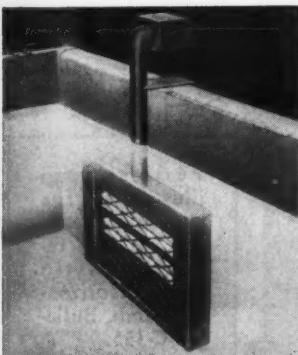
**Submersible heaters
have high efficiency,
low watt densities**

Available for either acid or alkaline solutions

Uses: Heating corrosive liquids.

Features: Elements are made of fused quartz or metal. Units can be completely submerged below liquid surface and are capable of high efficiency and trouble-free operation.

Description: Heating elements are mounted horizontally in compact rectangular cage or holder. Unit can be



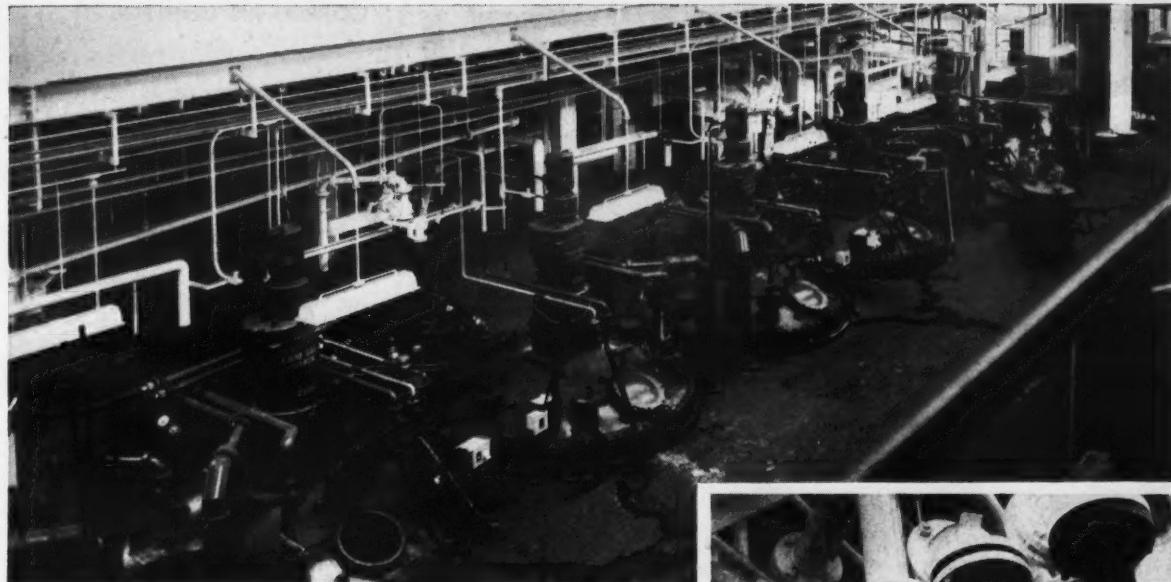
Heating elements are mounted in compact cage that fits on side of tank

equipped with one to four elements of 1000 or 1500 watts each. Units operate independently of each other.

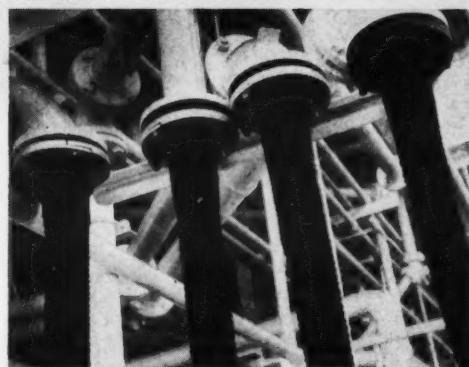
Design of element assemblies, permits efficient heating to be obtained with low watt densities (20 watts per sq inch for 1000 watt assemblies, 30 watts per sq inch for 1500 watt elements). Wiring is concealed to insure maximum service life.

(Heat-Pak heaters are product of Chemical Equipment Division, Electrical Accessories Co., 744 Broad Street, Newark 2, N. J.)

Check 2600 opposite last page.



**R/M RUBBER HOSE
Helps Hold Costs Down
in Modern Chemical Plants**



For example, at the new ultra-modern plant of Toms River—Cincinnati Chemical Corporation at Toms River, New Jersey—R/M custom-engineered hose saves manhours and protects vital processes. That's because R/M engineering made certain the *right* hose was made and supplied for each process function. Typical are the lines on the huge Manhattan rubber lined kettles shown above. The lengths of hose at right are specially engineered and equipped with leak-proof Hydro-Lok flanges to overcome process pipe-line problems. Throughout the Toms River plant, R/M hose constructions meet specialized job requirements handling corrosive chemicals and similar process solutions.

You can expect the same "engineering" with the R/M hose you specify for your plant. Easy handling Homoflex is ideal for wash-down operations, or wherever you use air or water hose for general service. For handling chemicals and acids, there's R/M Teflon Lined Hose and Condor Acid Hose available with rubber, neoprene, Butyl or Hypalon tube as required for specific conditions. Condor Flexible Pipe can outlast iron or steel as much as 10 to 1 for highly abrasive or corrosive solutions. R/M Rubber Expansion Joints will eliminate pipeline stresses, misalignment and vibration.

Depend on your R/M representative to suggest the engineered R/M hose construction to help you hold costs down—give you "More Use per Dollar" on every job.

ENGINEERED
RUBBER
PRODUCTS
... MORE USE
PER DOLLAR



RAYBESTOS-MANHATTAN, INC.
MANHATTAN RUBBER DIVISION, PASSAIC, NEW JERSEY

Check 2601 opposite last page.

QUIET!



New Lonergan liquid relief valve doesn't chatter; eliminates product waste; reduces maintenance

Ever hear a relief valve chatter? They all do! They shout their faults to the world, while beating themselves to death. When you can hear one, you know product is being wasted; maintenance costs are increasing; employees are growing annoyed; and perhaps dangerous, flammable liquids are running loose.

Now you can install a Lonergan Hydro-Valve guaranteed not to chatter, hammer, or drum, yet still deliver full rated capacity! Gone is the need to install an oversized valve or a high-priced, heavyweight regulator valve to eliminate chatter on by-pass and emergency relief applications.

The Lonergan Hydro-Valve does not contain any capacity-reducing gimmicks or gadgets to eliminate chatter. Instead, it is designed to be completely quiet under all operating conditions. It proves itself so on hundreds of applications every day.

Bellows models of the Lonergan Hydro-Valve are also available for corrosive applications. The elimination of chatter and its associated bellows flexing action, greatly extends bellows life and virtually ends the need for expensive bellows replacement. Full details are in a Hydro-Valve bulletin. Write for a copy today!

Lonergan

J. E. LONERGAN COMPANY, 203 RACE STREET
PHILADELPHIA 6, PENNA. • SINCE 1872

Check 2602 opposite last page.

CORROSION CONTROL

► A NEW SOLUTIONS ARTICLE

**Protect acid tank cars
with synthetic rubber
sheet lining**

Problem: Spent sulfuric acid, varying in concentrations between 40-90%, was destroying baked protective linings inside railroad tank cars at the Baton Rouge, Louisiana, plant of Consolidated Chemical Industries, division of Stauffer Chemical Company.

The plant produces 98% sulfuric acid from elemental sulfur for use by industries in the Gulf Coast area. Customers return the spent acid for regeneration. As a rule, the acid is shipped at ambient temperatures. Linings had to be repaired annually.

Solution: To overcome constant uncertainty as to interior condition of the spent acid tank cars, company had three cars lined with 3/16"-thick, Hypalon synthetic rubber



Synthetic rubber lining on interior of tank car being electrically tested for continuity

sheet. Product is made from chlorosulfonated polyethylene. Decision to use this material was based on previous experience with it on process equipment handling 20-78% sulfuric acid at 220-240°F.

Results: In use since November 1956, the tank car linings are still in good condition. Except for a few mechanically damaged spots that were easily patched, the linings have been virtually maintenance-free. Six additional cars have been fitted with the same material and are now in service.

(Hypalon synthetic rubber is product of E. I. du Pont de Nemours & Company, Wilmington 98, Delaware.)

Check 2603 opposite last page.

PUMP PROBLEMS
write
TABER

**BEFORE
DECIDING
ON TYPE
OF
PUMPS . . .**

SEE
TABER
BULLETINS

May avoid costly
pump misapplication.

Vertical pump illustrated, for handling chemicals, please request Bulletin V-837. Horizontal Pump, Bulletin C-355.

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TABER

Check 2604 opposite last page.

CHEMICAL PROCESSING

CORROSION CONTROL

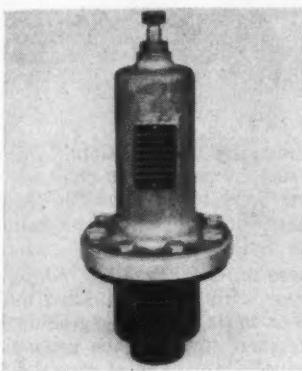
Pressure-relief valve has PVC body

Can resist corrosives up to 160°F, 120 psi

Uses: Controlling pressure in units handling corrosives.

Features: Valve body is made of polyvinyl chloride. Device can be used up to 160°F and 120 psi.

Description: Pressure-relief valve has good resistance to acids, alkalis, salt solutions, alcohol and other chemicals.



Plastic body on relief valve makes it suitable for use with many corrosives

Valve is made in various sizes up to 2" diam. Reduced pressure ranges are 5-15, 10-80 and 50-120 psi.

Spring-loaded, diaphragm-actuated, single-seat relief mechanism modulates in response to upstream pressure. At set pressure, valve remains shut and opens only when upstream pressure increases over set pressure.

(Further information about pressure-relief valve with PVC body may be obtained from Atlas Valve Company, 280 South Street, Newark, New Jersey.)

Check 2605 opposite last page.

► A NEW SOLUTIONS ARTICLE Pulp mill's broke chest protected by 25 ft domed cover

Corrosive fumes are being contained and broke chest contents protected by glass-

fiber reinforced polyester cover at Marathon Southern Corporation's pulp and paper mill in Naheola, Alabama. The dome-shaped cover has 25 ft. diam.

To facilitate shipment to job site, device was molded in eight pie-shaped segments. When delivered, these were



Glass-fiber reinforced polyester cover molded in eight pie-shaped segments, shown being assembled on job site

fastened together by cold bond process. To provide extra reinforcement, four turns of 3/16" stainless steel cable were imbedded around circumference. Eight bolts, one for each segment, fasten cover in place.

In addition to its corrosion resistance and high structural strength, cover's translucent quality permits clean-out inspection without need for lighting facilities. Similar units can also be pigmented to reflect sunlight and heat.

(Kabe-O-Rap cover was designed and built by Metal-Cladding Co., N. Tonawanda, N.Y.)

Check 2606 opposite last page.

(Cover was fabricated from Heton-92, polyester resin manufactured by Durez Plastics Division of Hooker Chemical Corporation, N. Tonawanda, N.Y.)

Check 2607 opposite last page.

NEXT MONTH

Roof corrosion can be an expensive headache. How Dow Chemical stymied HCl fumes by use of economical epoxy-coated concrete slabs is revealed in next month's Corrosion Control section. Suitability of the coating was established by means of a thorough program of testing and cost evaluation.

Would you like to receive CHEMICAL PROCESSING personally?

It will be sent to you without charge or obligation . . .

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If you are responsible for processing operations in an administrative capacity as plant superintendent, chemical engineer, chemist, engineer or equivalent responsibility . . . in a plant of substantial operations* where chemical processing is an important factor . . . CHEMICAL PROCESSING will be sent to you without charge or obligation if you request it. Use form below. In requesting, be sure to answer all questions. If your firm is not rated or listed in standard references, indicate size of the company by capacity, annual sales or number of employees. Unless all information is given, magazine will not be sent.

*"Substantial operations" does not necessarily mean an extremely large plant. But requests for the magazine exceed supply so we must set standards to insure publication being sent where it can be used to best advantage.

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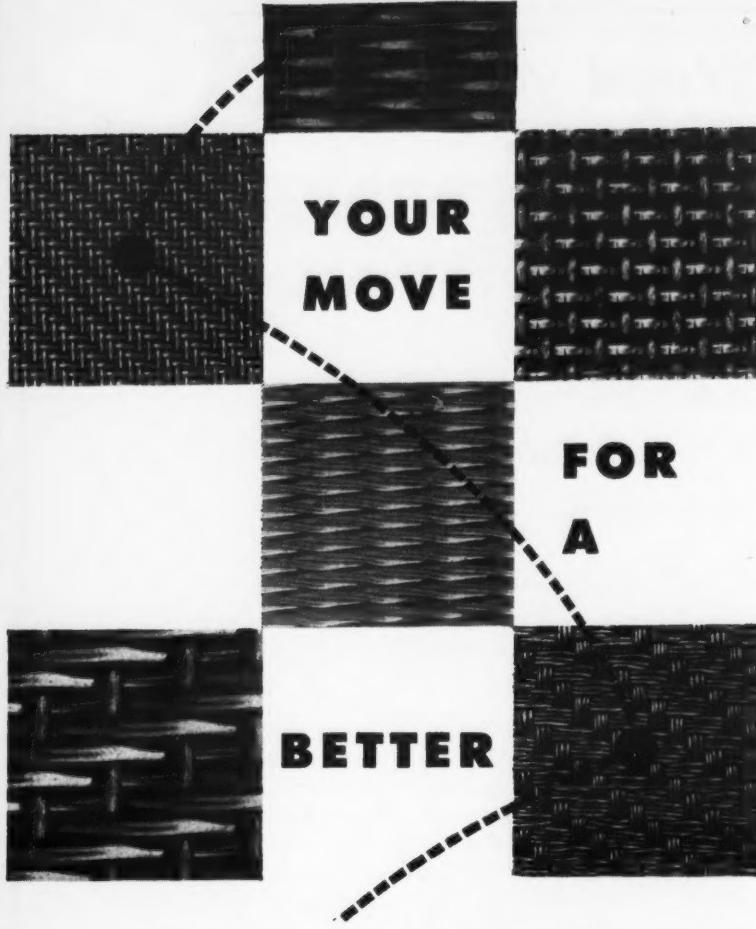
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City _____ Zone _____

State _____

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ANTI-CORROSION WIRE CLOTH

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Come to NEWARK for any woven wire cloth or fabricated wire cloth parts requirement, all widths, all meshes, all malleable metals. Send for latest literature.

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Check 2608 opposite last page.

CORROSION CONTROL

**Rust, scale, paint
are easily removed
by alkaline product**

Uses: Removing rust, carbon, scale and paint from ferrous metals.

Features: Product is non-acid, non-flammable. It contains no cyanide compounds and does not emit corrosive fumes.

Description: Heavy rust and stubborn paint deposits can be removed by means of simple one-tank operation followed by a pressure rinse. Product reduces steel's tendencies to darkening during processing and re-rusting after processing.

Metal objects withdrawn from process need no after-neutralization. Use of product requires mild steel tank of welded construction with stainless steel heating coil.

(Alkaline rust remover is product of Turco Products, Inc., 24600 S. Main St., Wilmington, Calif.)

Check 2609 opposite last page.

NEW LITERATURE Corrosion Control

Chemical analyses of standard carbon, alloy and stainless steels used for corrosion-resistant tube and pipe are tabulated in four-page folder. ASTM specifications are listed by number and title. Bul T-456 — Tubular Products Division, The Babcock & Wilcox Company.

Check 2610 opposite last page.

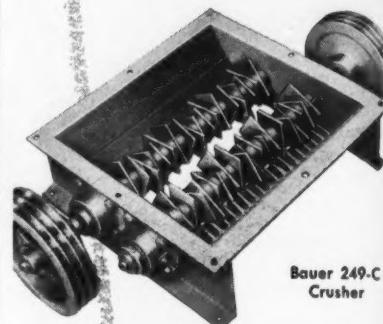
Ventilating and exhaust systems for corrosive environments are discussed in 14-page catalog. Made of polyethylene, systems are capable of operating at temperatures up to 150°F. Ventilating systems — American Agile Corporation.

Check 2611 opposite last page.

Simple method of maintaining alkaline pH in steam and condensate systems by use of proper amine formulations is explained in two-page technical bulletin. Test methods and other steps necessary to control dosage are outlined. Bul CS-111 — Ionac Chemical Co., Div. of Pfaudler Permutit Inc.

Check 2612 opposite last page.

**break
the lumps
of compacted
chemicals**

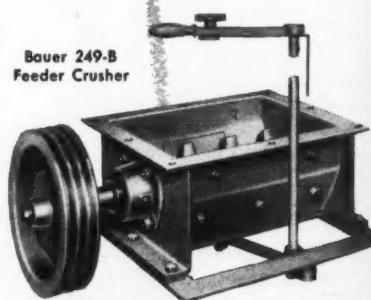


Bauer 249-C
Crusher

For breaking up compacted chemicals, such as potash and charcoal, or similar industrial materials, Bauer crushers can provide the uniformity of size you want.

These units can be used independently or with Bauer attrition mills, hammer mills, breakers, granulators or fiberizers to speed the processing of virtually any type of material.

If you have a special problem in size reduction, the experience of our engineers and research staff is at your disposal with no obligation. Write for more details.



THE BAUER BROS. CO.
Springfield, Ohio



Check 2613 opposite last page.

CHEMICAL PROCESSING

CORROSION CONTROL

Revised corrosion chart lists resistance of 400 different materials to 16 metals. Over 250 chemical salts and acids, as well as more than 100 common materials are tabulated. Bul 101—Nooter Corp.

Check 2614 opposite last page.

Teflon coating technique for metal and ceramic parts is discussed in four-page folder. Advantages and limitations are described. Properties of Teflon in solid and coating forms are compared. Teflon Coating Booklet — Cadillac Plastic & Chemical Company.

Check 2615 opposite last page.

Behavior of Penton can be easily assessed by glance at six-page fold-out chart. Almost 400 chemical reagents are tabulated. Revised edition shows ratings at 250 and 150°F. "ABC's of Penton"—Hercules Powder Company.

Check 2616 opposite last page.

How to treat water to insure trouble-free operation of cooling systems is told in six-page reprint. Flow diagram illustrates corrosive factors normally encountered. Reprint 88—Nalco.

Check 2617 opposite last page.

Pocket-size corrosion computer indicates to what extent eight metals withstand attack from 141 chemicals. Device is 4x8" card, operates like slide rule. Corrosion Computer—H. M. Harper Company.

Check 2618 opposite last page.

Fireclay refractories is topic of eight-page, four-color brochure. Specific products for medium, high and super-duty service are featured. "Quality Controlled Fireclay Refractories" — Harbison-Walker Refractories Company.

Check 2619 opposite last page.

Chemical resistance of polyester plastic construction panels to over 350 chemical environments is cited in eight-page booklet. Applications for the panels in the chemical industry are reviewed. "Resolute CR Panels" — Resolute Corporation.

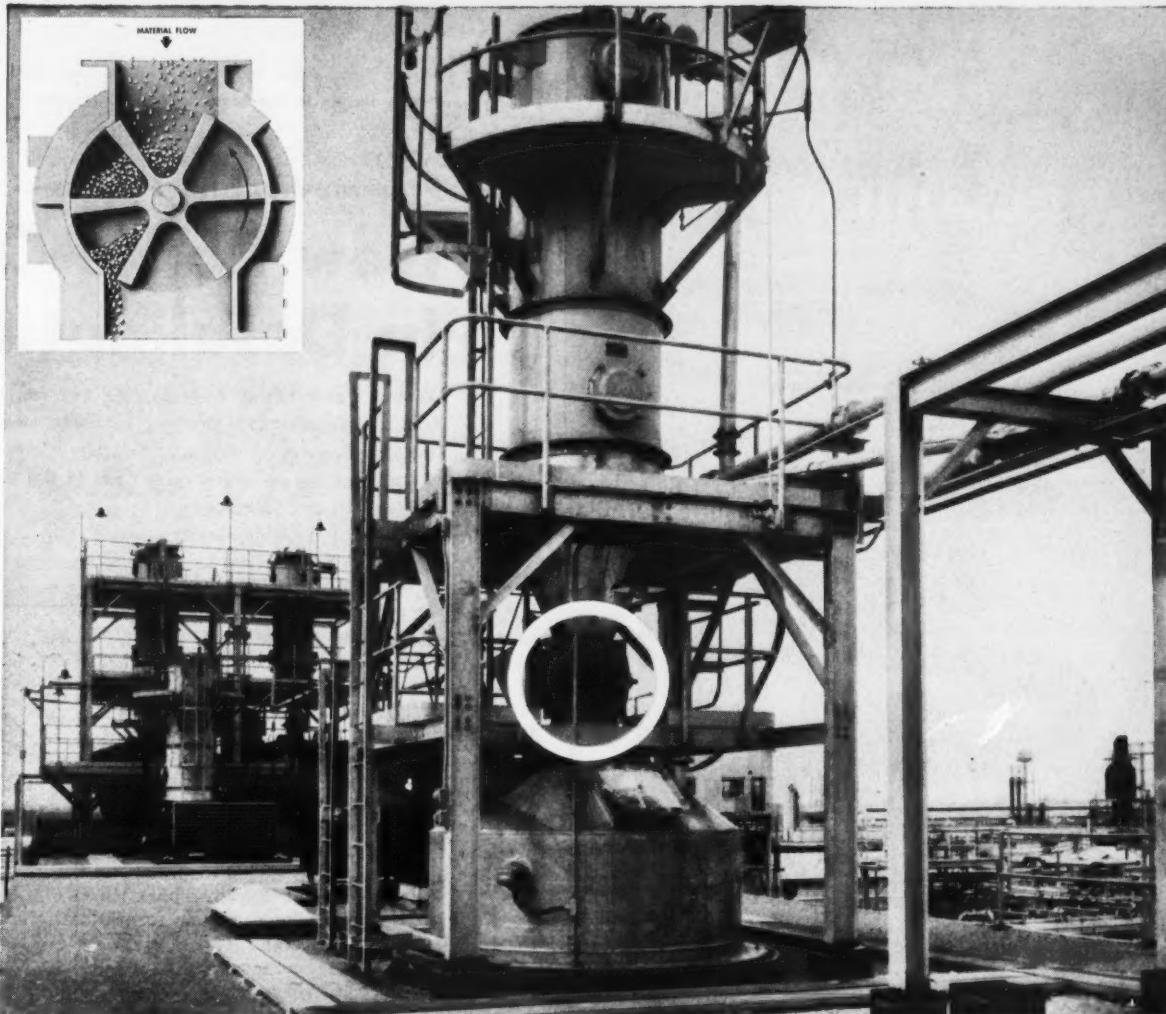
Check 2620 opposite last page.

Corrosion-resistant floors, linings and coatings are detailed in eight-page catalog. Chemical resistance of over 30 products are tabulated. Bul 604 — Ralph V. Rulon, Inc.

Check 2621 opposite last page.

Titanium and titanium alloy tube is reviewed in three-page data sheet. Information on heat treatment and welding is included. Data Memo 27 — Superior Tube.

Check 2622 opposite last page.



THIS RECEIVER on the roof of a processing building feeds polyethylene into storage bin through rotary lock (circle). Rotor and body (inset) are made of corrosion-

resistant, non-contaminating CF-20® alloy, a nickel-containing alloy many producers rate on top for handling highly-sensitive chemical products.

Solving a contamination problem...

How cast nickel stainless steel rotary locks resist corrosive attack...protect product purity

In the pneumatic conveying unit shown above, cast nickel stainless steel rotary locks regulate the flow of polyethylene to processing equipment.

Nickel stainless steel, with its hard, smooth surfaces, does not chip or erode, thereby protecting the polyethylene from metallic contamination as it passes through the six-compartmented locks. What's more, the alloy's smoothness prevents the product from hanging up on inside surfaces, prevents clogging. That means no costly losses through downtime and maintenance.

This is a typical example of how the corrosion resistance and strength of nickel stainless steel solves many problems in the chemical processing industries. Especially in the large-volume manufacture of products highly sensitive to contamination.

If corrosion, scaling or chipping threatens to contaminate your product, it will pay you to look into a new, 64-page booklet we've just issued.

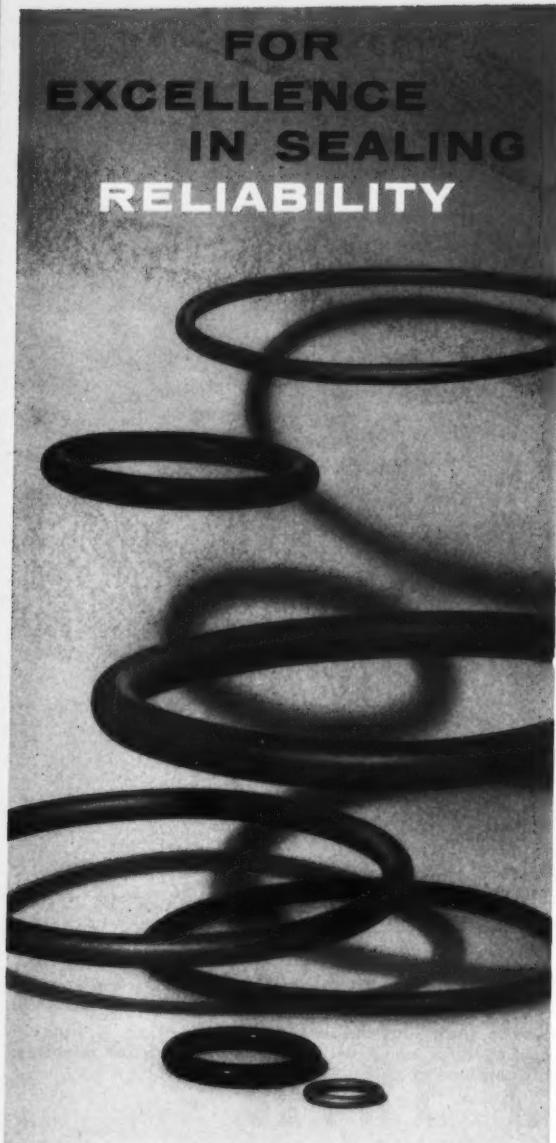
Titled "Heat Resistant Castings, Corrosion Resistant Castings...Their Engineering Properties and Applications," it contains a wealth of usable up-to-date information on the selection of proper alloys to solve your contamination problem. Write for a copy today. Just ask for booklet A-266.

*ACI designation

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street  New York 5, N.Y.

INCO NICKEL
NICKEL MAKES ALLOYS PERFORM BETTER LONGER

Check 2623 opposite last page.



Stillman has an enviable reputation for reliability in the development and production of O-Ring seals for military and industrial applications. The most difficult sealing requirements are met with ease because of Stillman's long years as sealing specialists for military projects where precision and reliability are prerequisites. Stillman O-Rings are produced in a complete range of sizes and compounds for both static and dynamic sealing. These O-Rings have found complete acceptability for the most critical applications. Unusual compounds such as silicone and Viton are standard in Stillman O-Rings. Still more exotic compounds are coming from Stillman laboratories each day, to meet the increasingly complex demands of present-day technology.

For further information, write to:

**STILLMAN RUBBER
COMPANY**

CULVER CITY, CAL./CLEVELAND, O./ENGLEWOOD, N.J.



Check 2624 opposite last page.



IDEAS: from other industries and nuclear field
— new trends in research, processes, services

Propane-hydrate Process—

New Route Opens Up In Desalination Quest

As the water tables dwindle, the cry for a commercially feasible desalination process is being sounded with an increasing note of urgency. Koppers Company feels that the answer lies in hydration — not in the usual techniques of freezing and distillation.

CAN THE OCEAN be made to give up 1000 gallons of potable water for \$0.50? Very definitely, according to personnel of Koppers Company, Inc. They will refer to Dr. W. E. Donath's U.S. Patent 2,904,511, held by Koppers. This covers a desalination process involving the use of a range of hydrate-forming substances.

The process which Koppers has developed on a laboratory scale utilizes propane as the hydrate former (1). (A simplified flow diagram for a commercial 10,000,000-gpd plant appears here.) Propane and water are combined to form insoluble clathrate crystals. These each have an approximate composition of 17 moles of water for every propane mole (2). The crystals are separated from the mother liquor, washed and decomposed to form immiscible layers of salt-free water and propane.

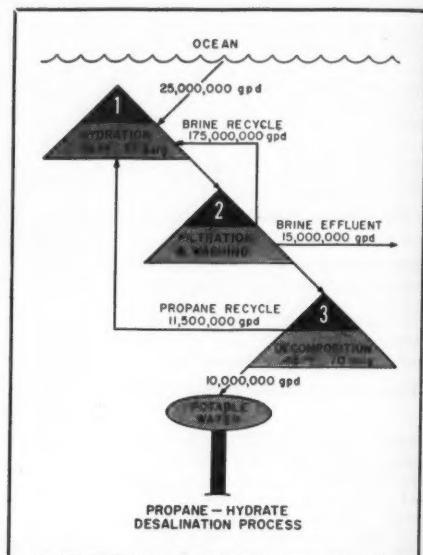
This engineering development is a significant one in the quest for economically feasible desalination in that it is a departure from the much-more-investigated approaches of freezing and distillation. In fact, at this writing it is the only known chemical process being commercially developed for saline-to-potable water conversion.

Economics: Freezing vs Propane Hydration

Koppers believes that a commercial-scale propane-hydrate desalination operation would have definite economic advantages over freezing techniques. They base this conclusion on the assumption

1) Although preliminary studies have indicated that propane is the most commercially feasible hydrate-forming material, others are still being considered.

2) Based on data resulting from preliminary laboratory investigations, a mole ratio of 18:1 was calculated. According to authorities in the field, it is possible that some of the cavities available for propane might not be filled. This would account for the difference between the 17 water molecules theoretically associated with propane and the 18 actually calculated.



that both energy and investment savings can be realized since the process operates at temperatures above those used in the freezing methods.

These higher operating temperatures produce less sea-water cooling (resulting in smaller heat exchangers) and a more efficient secondary refrigeration cycle (resulting in smaller compressors and condensers and lower energy costs).

A comparative study indicated that the energy requirements for the propane-hydrate process are 28% lower than those for a freezing process using butane refrigerant. This was attributed to the above-mentioned smaller heat load for the propane-hydrate process and the fact that propane is a more efficient refrigerant than butane over the temperature range involved.

Heats of decomposition and composition of the hydrate were calculated from

laboratory data. Heat of decomposition to liquid water and liquid propane was found to be about 150 Btu/lb of water. Therefore, quantity of heat which must be removed at hydrate-formation temperature is same as that required in freezing of water.

Concept of 10,000,000-gpd Commercial Plant

A hypothetical commercial propane-hydrate desalination plant has been conceived by Koppers. It produces 10,000,000 gpd of potable water. Incoming sea water is cooled by heat exchange with the outgoing product water and effluent brine. It is then fed into the reactor or hydrate-formation vessel. Here liquid propane and water combine to form clathrate crystals at about 35°F and 57 psig.

A slurry (containing 10 to 15% hydrate crystals) is then transported to the filter-washer. The temperature range here is about 35 to 45°F. This eliminates possibility of washer plugging from wash-water freeze-up.

The filter-washer produces washed hydrate crystals and brine. Part of this brine is recycled to the reactor. The remainder is discharged as effluent after heat exchange with both inlet sea water and propane-recycle system.

The recycle brine is required to maintain slurry concentration at a level which will permit slurry to be readily transported and to permit the ultimate conversion of about 40% of the sea water.

The washed hydrate crystals are moved to the decomposer where product water and liquid propane are produced. Product water is discharged after 1) heat exchange with both the inlet sea water and the propane-recycle system and 2) a degassing operation. Liquid propane is decanted and recycled to the reactor.

Propane serves a double role in the process: Hydrate former and internal direct-heat-exchange agent. When liquid propane is introduced to the reactor, it vaporizes to remove heat of formation of hydrate crystals. *To next page*

The new Series G CHEMPUMP practically eliminates the only two service points in a pump long known for its low maintenance burden . . . and you'll be pleasantly surprised at its lower price.

Two new features all but do away with bearing maintenance. A new automatic thrust balance design eliminates axial wear on the bearings by equalizing hydraulic pressures across the rotor and impeller. New front and rear carbon graphite bearings are three times as large, more than tripling radial bearing surface and therefore bearing life.

Motor life is greatly extended because the CHEMPUMP stator cavity is filled with a dielectric oil that increases heat dissipation from the windings. A specially designed relief valve protects the stator cavity against oil pressure buildup.

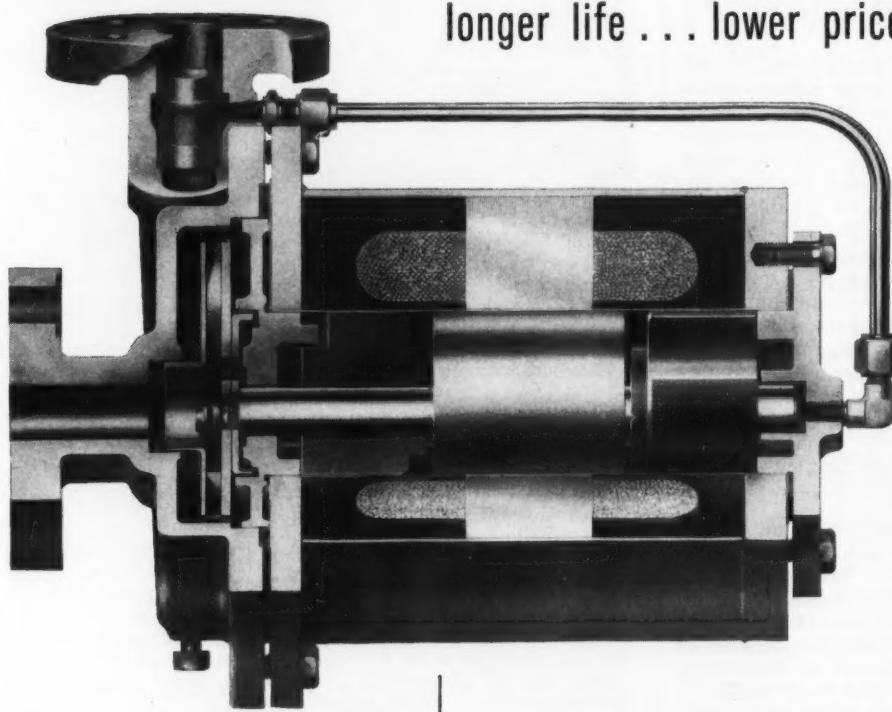
And you don't have to worry about "new product bugs": The new CHEMPUMP features have been field-proven in more than 100 field installations for over a year.

Series G incorporates many other field-proved design features that have accrued from more than 10 years of experience and leadership by CHEMPUMP—the original canned pump manufacturer.

For a full description of the new Series G CHEMPUMP, write for Bulletin 2050. CHEMPUMP DIVISION, FOSTORIA CORPORATION, Buck and County Line Roads, Huntingdon Valley, Pa.

NEW LEAKPROOF CHEMPUMP®

longer life . . . lower price



CHEMPUMP

First in the field . . . process proved

Check 2625 opposite last page.

FLUIDICS* AT WORK

Propane from the reactor is passed through the system's primary compressor and then condensed in the decomposer on the washed hydrate crystals. This simultaneously condenses the propane and supplies the necessary heat for decomposition of hydrate crystals to product water and liquid propane.

The refrigeration system consists of two stages: low-temperature primary and high-temperature secondary systems. Heat liberated in reactor by formation of hydrate vaporizes propane. This vapor goes through primary compressor, along with additional vapor generated to overcome heat leaks into reactor system.

Most of the vapor leaving the primary compressor flows to the hydrate decomposer. Here it condenses to provide heat of decomposition of the propane hydrate. Condensed propane, together with propane liberated from the hydrate, flows to the hydrate reactor where the cycle is repeated.

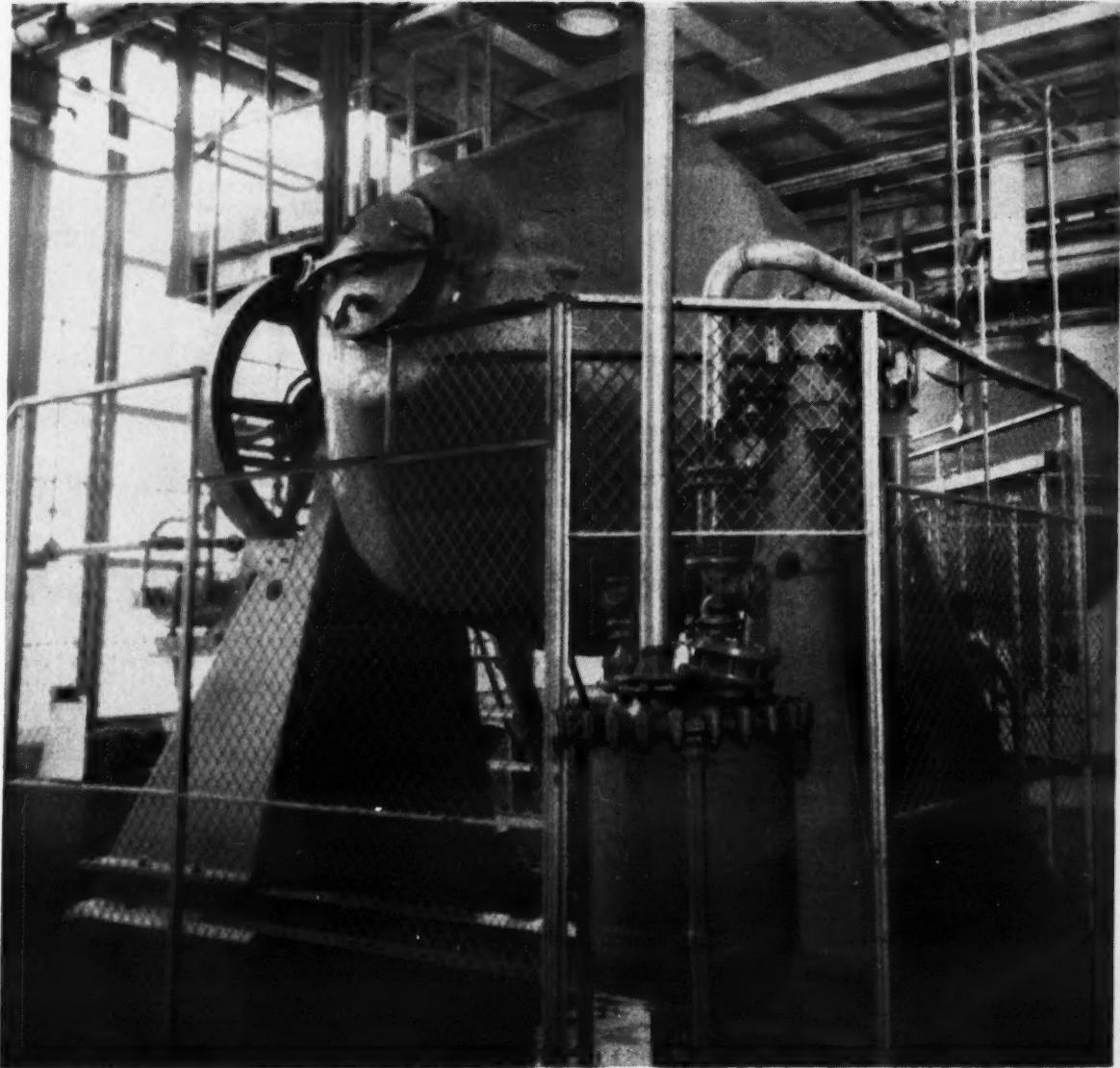
Excess propane vapor discharged by the primary compressor is fed to a secondary compressor. The compressed vapor is condensed and sub-cooled by heat exchange with the potable-water product, brine effluent and additional untreated sea water.

When condensed secondary propane flows into decomposition vessel, part of it flashes. Balance is recycled with rest of liquid propane to the hydrate reactor. Both brine effluent and the potable-water product are discharged from the process through turbines to recover part input.

(This article is based on the technical paper, "The Hydrate Process — Engineering Aspects," given before the AIChE in Washington, D.C., on December 6, 1960. It was authored by W. G. Knox, M. Hess, G. E. Jones Jr. and H. B. Smith Jr. of Koppers Company, Inc.)

(Further information on the propane-hydrate desalination process may be obtained from Koppers Company, Inc., Pittsburgh 19, Pa.)

Check 2626 opposite last page.



HOW MERCK ACHIEVES UNIFORM DRYING

If your process involves bulk drying, you will be interested in how Merck & Co., Inc., handles it at their Flint River plant.

Here, Pfaudler® Conical Dryer Blenders are used to dry a coarse crystalline, acid-salt intermediate, and a fine crystalline, white finished product under closely controlled vacuum and temperature conditions.

Feed goes in with moisture content of approximately 25% and comes out with a residual moisture of less than 1%. The thorough tumbling action achieves a constant, uniformly blended product as

evidenced by the quality of the test samples.

And, since product is bulk charged directly into the dryer and discharged into shipping containers, Merck has minimized their product handling.

Resists corrosion. You can use the Pfaudler Conical Dryer Blender with all acids (except HF) and most alkalies without concern over corrosion, since the interior is Glasteel.

Protects purity. This inert glass product-contact surface also protects product purity. Because glass is fire-polished

smooth, there's little build-up so cleaning is quick and complete.

Versatile. This unit can also be used for impregnating, concentrating, reacting and coating—all in a single operation. Such versatility makes further savings possible in capital investment, time, and floor space.

Choice of models. There are four production models with capacities from 2.6 to 165 cubic feet as well as a $\frac{1}{2}$ cubic foot lab unit for test purposes. Ask for Bulletin 963.

Why the "RA" Reactor is different

The compact silhouette and exterior light-blue color of the recently introduced "RA" Series Reactors hide one of our biggest improvements in this line—the Glasteel 59 interior.



Corrosion resistance. Glasteel 59 offers excellent resistance to all acids (except HF) up to 350°F., and even to 450°F., depending on concentration. Mild alkalies under moderate temperatures are also permissible.

The smooth surface of Glasteel 59 resists build-up of sticky products. You have high heat-transfer rates, increased product yield, fewer shutdowns for cleaning, much longer service life.

Thermal shock resistance. At a vessel temperature of 250°F., the safe recommended temperature differential is now 260°F. A 30% increase.

Abrasion resistance has been increased 20% over previous standards.

Two drives. On the outside, you can select either the TW drive for power requirements to 15 H.P., or the BH if your needs take you up to 60 H.P. and higher. Both are compact, easily installed and maintained.

Mirror-image top head. The symmetrical pattern formed by an equal number of nozzles on each half of the top head means you need only a minimum of headroom and pipe to hook up an "RA" Reactor.

Offset drain. For fast drainage, the outlet is offset and in the direct sweep path of the agitator.

Large and small. Standard "RA" Reactors cover the capacity range from 300 to 4,000 gallons. Custom designs to 8,000 gallons.

Bulletin 988 puts all the details at your finger tips. Write for it.



Portable generator rated at 3000 w of AC power

Uses: Provides emergency power and packaged power on the job site for outlying areas.

Features: Permanent magnet rotating field generates electric power, eliminating all brushes, slip rings, or commutator. Permanent magnet, internally fan-cooled and corrosion protected, connects directly to engine shaft without coupling. Light weight permits it to be moved readily.

Description: Rated at 3000 w, 115/230 v, 60-cycle, single phase, generator is powered by rope-started, 1-cylinder, 4-cycle, air-cooled gasoline engine. It will operate for approximately 5 hrs of full load running on a fuel tank capacity of 2-3/4 gal.

It is equipped with a positive action fuel pump to permit connection to an auxiliary fuel tank of larger capacity. Accessories include an electric starter, auxiliary fuel tank, and exhaust extension for use in confined areas.

(Model GW-300 electric generator is a development of the Pescos Products Division, Borg-Warner Corporation, 24700 N. Miles Rd., Bedford, Ohio.)

Check 2628 opposite last page.

Heavy water joins list of lease/purchase items

Heavy water (deuterium oxide), a component of nuclear reactors and key material in many basic studies, now can be leased for periods ranging from 3 months to 2 years.

The procedure is as follows: A customer uses the heavy water on a lease/purchase basis. When he returns it, he receives a credit based on length of time the water was kept and the amount of dilution it has undergone.

Returned water is checked for tritium contamination and then returned to process stream for re-enrichment.

(Heavy water lease plan is available from Bio-Rad-Laboratories, 32nd and Griffin Ave., Richmond, Calif.)

Check 2629 opposite last page.

— NEW BULLETIN —

Glasteel, the Material of Construction

Just off the press is our four-color Bulletin 985, documenting the characteristics of Glasteel 59.

Of its 20 pages, 16 are devoted to technical data on specifications, thermal shock, operating temperatures, heat transfer, alkali resistance, acid resistance, and corrosion evaluation facilities.

This is the first time all pertinent data on Glasteel have been brought together in a single brochure. The results are impressive. Quite possibly, this bulletin will suggest ways in which you can put this material of construction to use—reducing costs, improving service life of equipment, protecting product purity.

We think you'll find Bulletin 985 a worthwhile addition to your file. Write for your FREE copy.

Please address all inquiries to our Pfaudler Division, Dept. CP-21, Rochester 3, N.Y.



*FLUIDICS is the Pfaudler Permutit program that integrates knowledge, equipment and experience in solving problems involving fluids.

See for yourself. Schedule a test of your product in Pfaudler's Test Center. For details, write for Bulletin No. 1002.



PFAUDLER PERMUTIT INC.

Specialists in FLUIDICS...the science of fluid processes

Check 2627 opposite last page.

NEW PORTABLE PROPELLAIR® TUBEAXIAL FANS with FLEXIBLE DUCT

WRITE: PROPELLAIR DIV.
ROBBINS & MYERS, INC.
SPRINGFIELD, OHIO



Check 2630 opposite last page.

NEW!

MOLYKOTE® Lubricating Sticks

Ideal for many rub-on applications

The Alpha-Molykote Corp. c.p.-2
Stamford, Conn.
Please send me your Bulletin 128.

NAME _____ Send For
COMPANY _____ Our New
ADDRESS _____ Bulletin 128
CITY _____ On Molykote
ZONE _____ Lubricating
STATE _____ Sticks

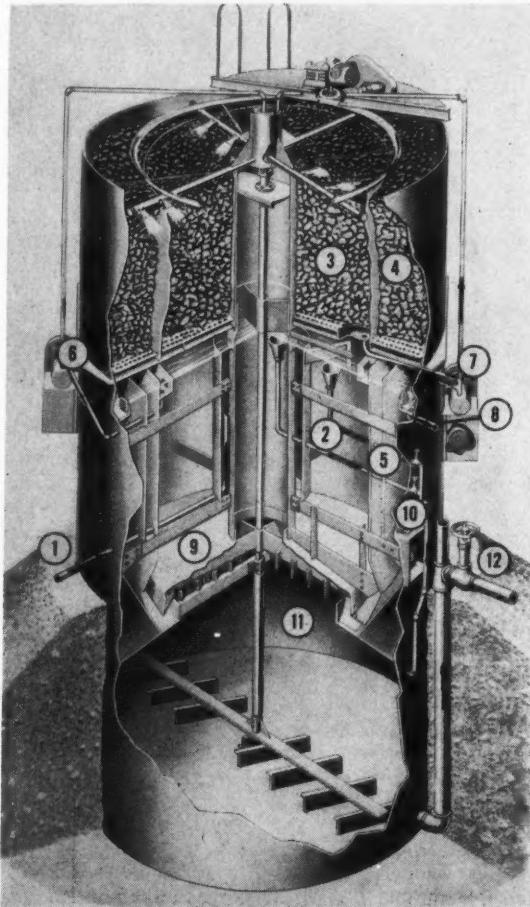
THE ALPHA-MOLYKOTE CORP.
Stamford, Conn.

Check 2631 opposite last page.

IDEAS

Big-city sewage treatment for rural chemical plants

Bio-filtration process scaled down,
packaged in compact, low-cost,
economically-operable unit



Compact bio-filtration treatment unit: 1) influent from pump (unit can also be fed by gravity); 2) primary settling compartment; 3) primary filter; 4) secondary filter; 5) final settling compartment; 6) primary recirculation pump (positive displacement); 7) secondary recirculation pump (positive displacement); 8) effluent; 9) separator, which also serves as sludge collector for primary settling and as scum breaker for digester; 10) scum draw-off pump which is time-clock-operated to remove scum from primary settling compartment; 11) sludge digestion compartment; and 12) sludge draw-off. Pumps are driven by individual 1/2-hp motors while primary and secondary distributors, separator, mixer and collector, and scum skimmer are driven by single 1/2-hp motor.

TAKE THE FEATURES of a big-city sewage treatment plant, scale them down, wrap them in a compact package, and you have an answer to the problem of domestic waste disposal for a rurally-located industrial plant.

Recently introduced was just such a system, available in four factory-assembled portable units for population-equivalents of 50 to 200; and four larger units, sub-assembled at the factory for on-site erection to accommodate population-equivalents up to 500.

Initial cost for a complete ready-to-operate installation, including the basic unit and auxiliary equipment, erection, external plumbing, wiring and all field work (excluding sewers), ranges from \$60 per capita for 500 people to \$240 per capita for 50 people).

Power requirements vary from 1.5 to 2.0 kw. Operating care can be handled on a part-time basis by one person who need not be highly trained.

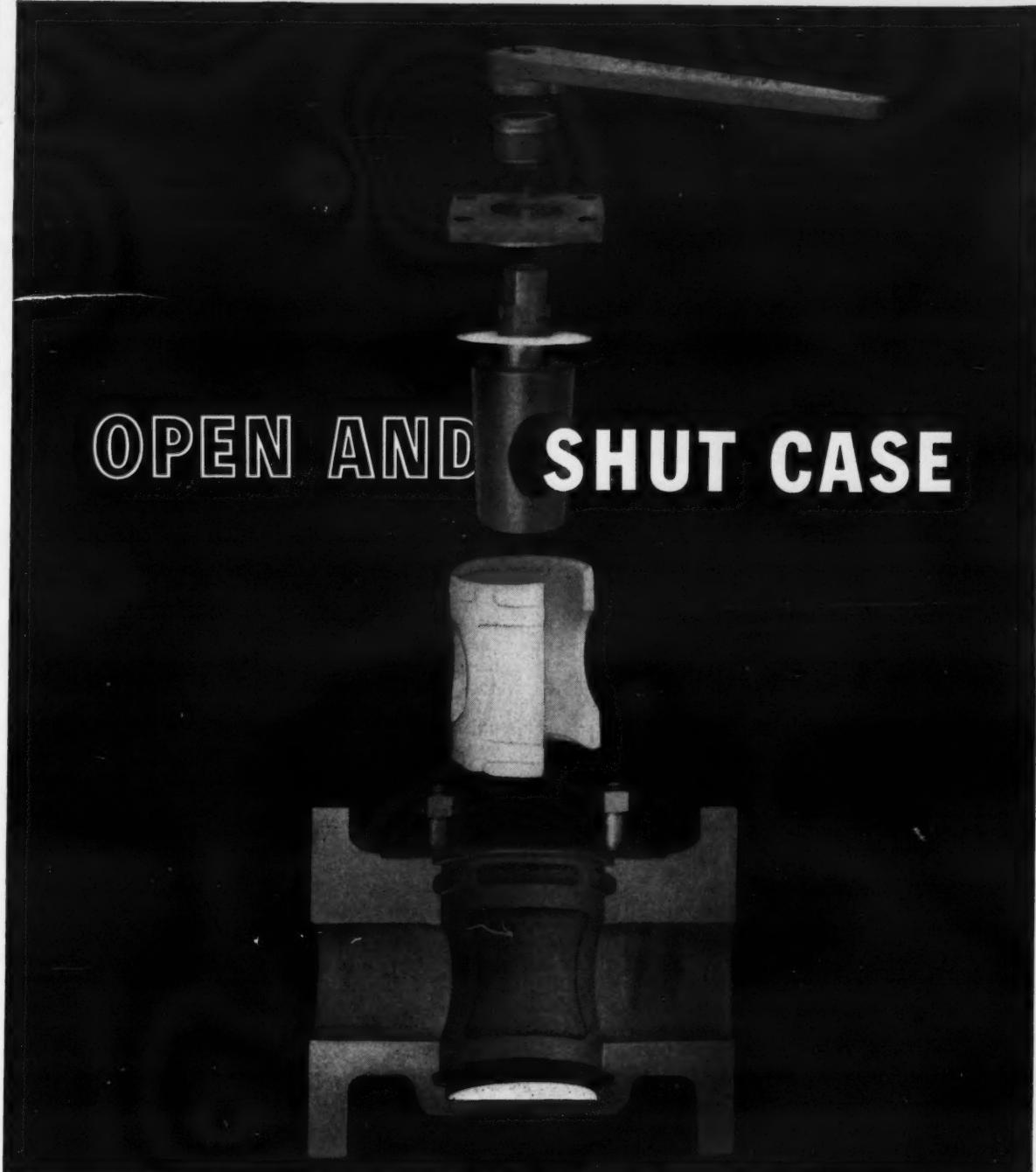
Protection against erosion is afforded by epoxy resin coatings and magnesium anodes.

Units range in size from the smallest which has an 8' diam and is 22' 3" tall to the largest with 18' diam and 30' 7" height.

The system utilizes a completely automatic two-stage bio-filtration process with 2:1 recirculation (1:1 in each stage) and designed to meet criteria established by the "Ten States Standards for Sewage Works." Design is based on a 24-hr average design flow of 100 gal/capita and a BOD (Biological Oxygen Demand) loading of 0.17 lb/capita/day. It is not recommended for industrial waste.

In operation, raw sewage flows by gravity or is pumped to the primary settling compartment for the first stage of gravity separation. The resulting effluent is then pumped to the primary bio-filter for initial bacterial action.

The primary filter effluent is divided into two portions—one is recirculated to the primary



Leakproof sealing without maintenance in ON-OFF service makes an open and shut case for specifying Continental's TUFLINE non-lubricated plug valves. ■ For the facts of the case, examine closely the special high pressure sealing ribs and carefully sculptured body bore configuration. This, combined with the specially tempered pure Teflon* sleeve and tapered plug, is where Tuflite valves pay off...in bubble-tight sealing without plug adjustment even under fluctuating temperature conditions.

■ For complete information on Tuflite valves 1/4" through 10", 150# and 300# class, 2-way through 5-way, or jacketed, furnished in a wide range of metals for services from light hard-to-hold gases to heavy corrosive slurries, temperatures -150°F. to +400°F., high vacuum to 615 psi (depending on temperature), write Continental Mfg. Co., 230 Park Ave., N.Y. 17, N.Y. ■ *Registered trademark of E. I. DuPont de Nemours & Co., Inc.

TUFLINE PLUG VALVES

CONTINENTAL MANUFACTURING COMPANY • CINCINNATI 42, OHIO

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for uniform results
in . . . BAKING
DRYING
CURING
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select
**YOUNG BROTHERS
OVENS and DRYERS**
*designed and built
for individual product
and process requirements*

Batch and Conveyor Types up to 1000° F
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 Over 60 years of service



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963-C

Bellows-Valvair
 AKRON 9, OHIO
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

Check 2634 opposite last page.

IDEAS

settling compartment; the other is pumped to the secondary filter.

Following further bacterial treatment in the secondary filter, the effluent is put through the final settling compartment where the flow is again divided—one portion being recirculated to the secondary filter and the other discharged to the receiving stream.

Combined action of aerobic bacteria in the two bio-filters removes 85 to 95% of the raw sewage solids and BOD, and a stable effluent is produced after being passed through the secondary settling compartment.

Sludge from both the primary and final settling compartments goes into the digester where it is completely digested to a stable product. Digested sludge may be diverted to drying beds or hauled away by tank about once or twice a year.

Available for special requirements is such auxiliary equipment as a comminutor station, two types of raw sewage pumping stations (self-priming and centrifugal), chlorine contact tank, recording and totalizing flowmeter, and flow division box.

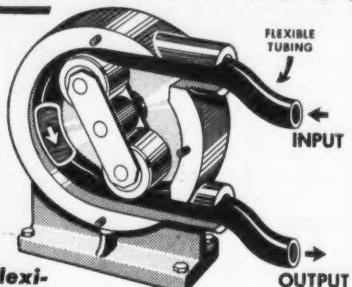
If, through mechanical or electrical failure, one recirculation pump is temporarily out of service, the plant operates as a single-stage bio-filtration unit. If both pumps are out of service, primary treatment is still accomplished.

A full-scale prototype, designed for 150 people, has been in operation with full hydraulic loading on a 24-hr/day basis since October 1959. Operating results prove that an average BOD of 250 ppm and suspended solids of 200-250 ppm in the raw sewage can be reduced to an average of 30 ppm BOD and 30 ppm suspended solids.

(Folder 2971, which provides full information for computing requirements for any system, is available from Department 60-B, Link-Belt Company, Prudential Plaza, Chicago 1, Ill.)

Check 2635 opposite last page.

The Pump That Never Gets Wet



Fluids flow
through a flexi-
ble tube without
contacting
the pump.

CAPACITIES UP TO 185 G.P.H.

RANDOLPH PUMP

For Literature and
prices, write the
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JAckson 6-2091

Check 2636 opposite last page.

Babbitt Adjustable SPROCKET RIM with Chain Guide
CHANGES THAT DANGER ZONE TO A SAFETY ZONE



— enables you to
ADD PLANT AREA

If re-aligning equipment will yield more working space, better production, lower costs — do it NOW. Save all space wasted for placing ladders to reach overhead valves. At the same time, convert Danger Zones to Safety Zones. Equip every overhead valve wheel in your plant with Babbitt Adjustable Sprocket Rims with Chain Guides.

- They simplify pipe layout.
- They fit any size valve wheel.
- They are easy to install and operate.
- They operate any valve from the floor.
- They save time and money.
- The first cost is the only cost (no maintenance).
- They are packed completely assembled (one to a carton), with easy-to-follow instructions.
- A hot-galvanized rust proof chain is available for all sizes.

Babbitt Adjustable Sprocket Rims with Chain Guide are carried in stock by most mill supply houses. Just phone your mill supply salesman, or contact us direct.

Babbitt STEAM SPECIALTY CO.

14 BABBITT SQUARE, NEW BEDFORD, MASS., U.S.A.

Check 2637 opposite last page.

CHEMICAL PROCESSING

**Linear polyethylene chutes
replace steel in coal
processing plants**

Corrosion resistance, lighter
weight among advantages

Chutes fabricated of linear polyethylene are chalking up impressive records in coal processing plants in Pennsylvania.

In use for more than 6 months at a fine coal processing plant of Jeddo Highland Coal Company in Jeddo, Pa., the polyethylene chutes are being considered for replacement of all steel chutes in the plant.

Principal advantage of linear polyethylene is the plastic's total resistance to corrosion by the acids present when coal is conveyed in mixture with water. Its lighter weight ($\frac{1}{8}$ that of steel) reduces installation costs. Linear polyethylene is less expensive than stainless steel now used for coal chutes and is in the same price range as high carbon steel, also used.

(Linear polyethylene chutes are fabricated by Abutco Plastics Industries, Inc., Hazleton, Pennsylvania.)

Check 2638 opposite last page.

(Fortiflex linear polyethylene, used in the Abutco chutes, is produced by Celanese Corporation of America, 180 Madison Ave., New York 16, N.Y.)

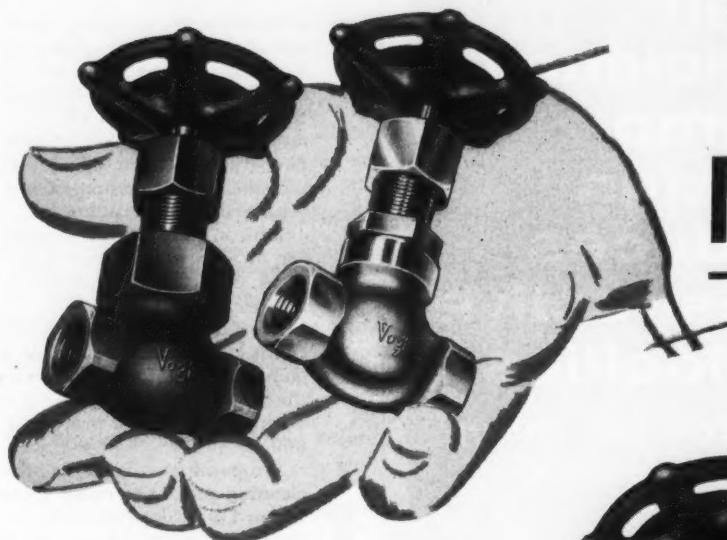
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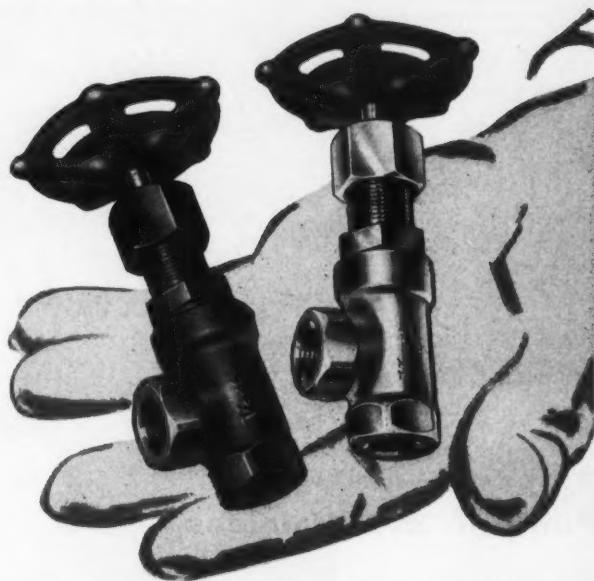
"Hello . . . purchasing?
Remember those drums I
asked you to order . . .?"

Gordon and Johnson,
American Marietta Co.

New **higher quality**



New **lower price**



Enlarged production facilities combined
with improved manufacturing techniques
enable Vogt to pass on the effected
savings to our customers.

Service proved — these valves have always
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and gauge line service. You no longer
need to compromise for less because
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from stainless or carbon steel for every
meter and gauge line service.

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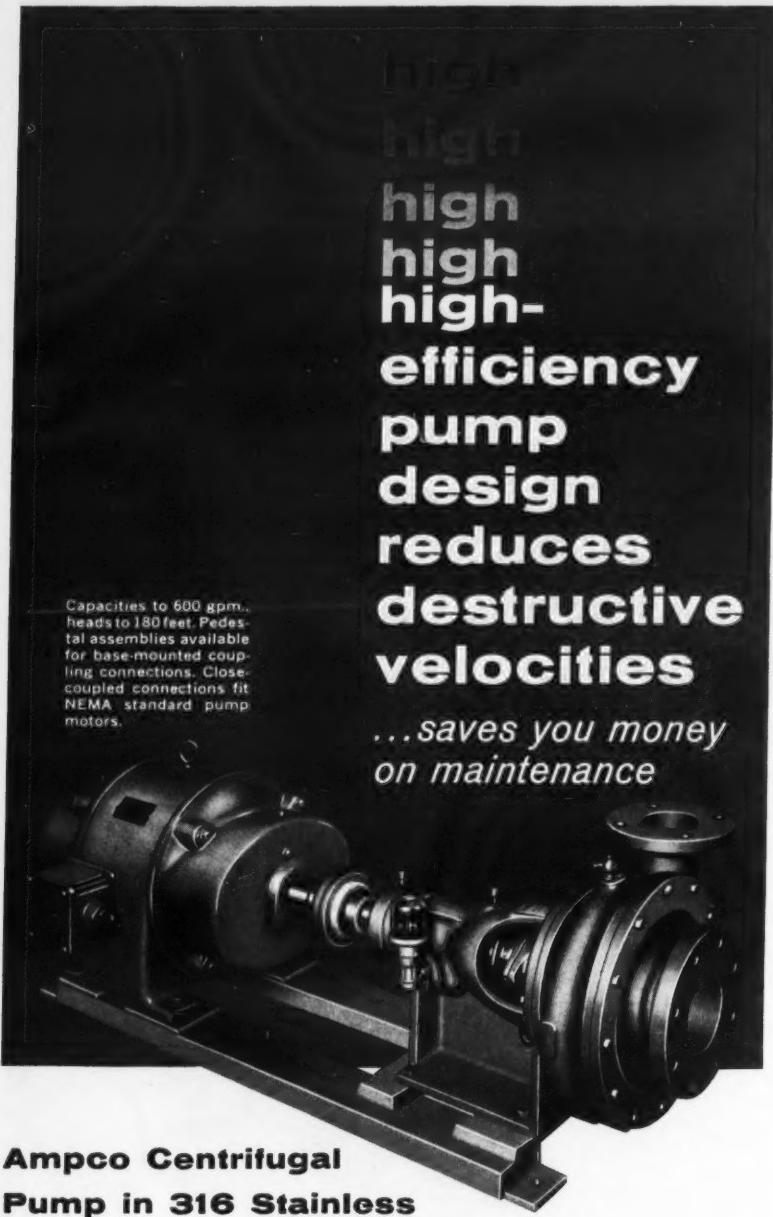
Vogt

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Louisville, Kentucky

SALES OFFICES: Camden, N.J., Charleston, W.Va., Chicago,
Cleveland, Dallas, Los Angeles, New York, St. Louis.

Check 2640 opposite last page.



high high high- efficiency pump design reduces destructive velocities

*...saves you money
on maintenance*

Capacities to 600 gpm.
heads to 180 feet. Pedestal assemblies available
for base-mounted coupling connections. Close-coupled connections fit
NEMA standard pump motors.

Ampco Centrifugal Pump in 316 Stainless

Ampco's modern design lengthens pump-life and steps up efficiency several ways:

Interface velocity is reduced — losses by hydraulic friction, shock, and turbulence are practically nil. Velocity, corrosion and abrasion are held to a minimum.

Pressure break-down areas are restricted to parts that are inexpen-

sive and convenient to replace. Casing and shaft are protected — new-pump characteristics are maintained longer.

In addition to stainless steel, Ampco Centrifugal Pumps are available in Ampco aluminum bronze and Illium "G." Elastomer-lined pumps are also available. Representatives in principal industrial areas.

Write for Bulletin P-3c. Do it today.

P-38

*Don't overlook EFFICIENCY
...it's a yardstick of
performance!*



AMPCO METAL, INC.

Dept. 139B, Milwaukee, I, Wis.

West Coast Division: Huntington Park, Calif. • Southwest Division: Garland (Dallas County), Texas

Check 2641 opposite last page.

IDEAS

► A NEW SOLUTIONS ARTICLE

Thermostatic controls end suture damage due to water temp changes

Production bottleneck solved by change from hand controls

Problem: Water temperature variations during cleansing damaged sutures produced at the Chicago plant of Ethicon, Inc. Production was also delayed while desired liquid temperatures were being obtained in processing tanks during filling operations.

Ethicon is a major processor of absorbable surgical sutures, made from animal intestines.

The problem of temperature control was critical at two points in the operation — in the cleaning machines and during the filling of processing tanks.

Temperatures used in the cleaning machines range from 100 to 119°F, depending on the thickness of intestine being processed. If the water is hotter than prescribed, the material will cook. Any colder, and the mucus in the intestines will not be thoroughly removed. Hand valves were used to control the temperature, but employees could not cope with temperature fluctuations caused by water demands in other parts of the plant.

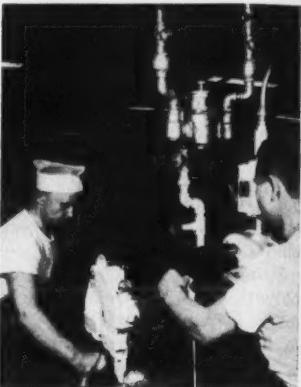
In the processing operation, intestines cut into long strips, are passed through a water spray in the machine by a system of rollers. The water rate is 10 to 20 gpm.

After being cleaned, the intestines are put through a series of other processes, one of which is another cleansing operation in the processing tanks.

These tanks, are 34" long and hold 200 gal of liquid, a combination of chemical and water, in six compartments. Liquid temperature must be maintained at 105°F, which is accomplished by an electrical heater on each tank, activated by thermostats within the tank. The heater warms the liquid as it is circulated through a heat exchanger at

the rate of 25 gpm. Tanks are emptied and cleaned daily.

When the liquid being used to fill the tanks was not at the proper temperature, the operation would be delayed while the heaters were bringing the temperature up.



Thermostatic water control, shown above, supplies water at 20 gpm to the washing machine at a constant temperature as employees pass suture material through a shower bath at Ethicon, Inc.

Solution: Individual thermostatic water controls were installed on the cleaning machines. These automatically maintain the temperature of the water within 1°F. The hand valves were eliminated.

A thermostatic control, capable of handling 40 gpm, was installed to maintain the temperature in the processing tanks within 1°F.

Results: Damage to sutures has been reduced 100% by the change in water controls.

In addition, the production delay entailed in time lost while employees were waiting for processing tanks to be warmed or cooled, has been eliminated.

(Type N Hydroguard is described in Bul 362 which is available from The Powers Regulator Company, 3434 Oakton St., Skokie, Ill.)

Check 2642 opposite last page.

For more information on developments in this section, check the Reader Service Slip.

Oak Ridge to build molten salt reactor for study of power potential

Information gleaned from the aircraft nuclear propulsion program will be used in a molten salt reactor experiment being launched at the Oak Ridge National Laboratory to investigate reactor's potential for electrical power.

The molten salt reactor concept offers the potential economic advantages of excellent steam conditions and higher efficiency through operation at very high temperatures and specific power. Since the fuel is in solution, no fabrication of fuel elements is necessary and continuous removal of fission poisons is possible.

Being designed as a 10,000 thermal kw reactor although routine operation will be at about 5000 kw, unit is expected to be in operation by Spring of 1963. No electrical power will be produced.

Planned as a single region reactor for operation at 1225° F, unit will have a cylindrical graphite core about 4½' in diam and 5½' high. Columns of graphite will extend the full height of the core. The fuel, a solution of fluorides of lithium-7, beryllium, uranium, zirconium and thorium, will be pumped through some 600 channels in the graphite columns. Heat will be removed from the fuel solution in primary heat exchanger that will use a mixture of lithium and beryllium fluorides as the coolant.

Plasma torch produces heat without fuel

Temperatures exceeding 3000° C have been achieved with a device that doesn't consume any fuel.

The device, called a plasma torch, operates by using the energy of a high frequency electromagnetic field to break up and ionize gas (nitrogen) molecules into their component atoms and then allowing them to recombine into their original state. When recombination occurs the absorbed energy

TERRIFIC!

- and how long will the flexing member last?

Good question. The heart of Para-flex is a tire with synthetic tension members bonded together in rubber—which provides a flexing body that automatically compensates for all combinations of misalignment and end float, and absorbs vibration as well!

This amazing coupling has now been used in American industry 4 years. Thousands are in operation—in steel mills, paper mills, oil fields, mines, quarries, chemical plants, everywhere—and in these 4 years, replacements of elements have been negligible.

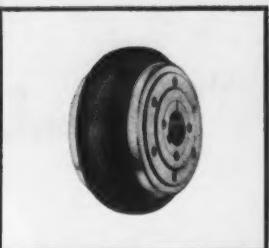
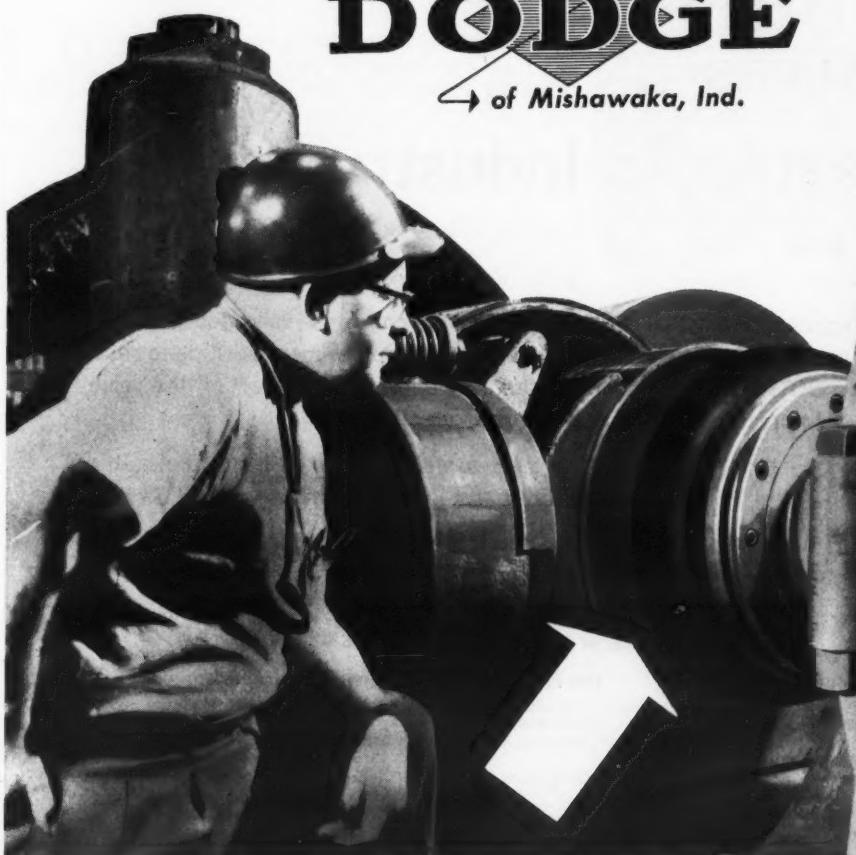
Dodge Para-flex takes angular misalignment up to 4°, parallel misalignment up to $\frac{1}{8}$ " and end float up to $\frac{5}{16}$ " depending upon the size of the coupling and the duration of shaft displacement.

Dodge Para-flex is available in 3 types—Standard, Flywheel and High Speed (shown at right). The Standard type is stocked in capacities up to 2000 hp at 1080 rpm. Ask your Dodge Distributor, or write us for complete technical bulletin.

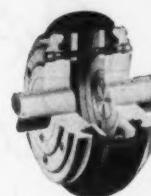
Dodge Manufacturing Corporation, 6200 Union Street, Mishawaka, Indiana

The Products with the Pluses...

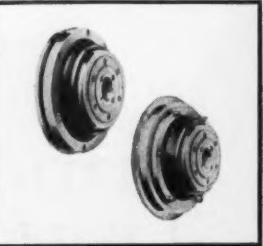
DODGE
of Mishawaka, Ind.



The new idea in flexible cushion couplings, with a flexing member that "swallows up" misalignment.



No lubrication, no maintenance. Replace flexing element without moving driver or driven machine.



Flywheel and High Speed Types. For use with motors and internal combustion engines turning up to 5230 rpm.



Check 2643 opposite last page.

IDEAS

"Double-Seal"

*Outline for
Successful
Valving*

jamesbury
BALL VALVES*

*PATENTED

As Versatile As Industry Itself!

The words "Double-Seal" have delivered a new concept of valve dependability and performance. The exclusive "Double-Seal" design means complete shut-off on BOTH sealing surfaces of the ball. Because of this action the valve will hold pressure equally well in either direction.

In long term high-cycling through a wide variety of applications, the "Double-Seal" Ball Valve has proven virtually maintenance free.

For maximum leak-proof performance, full flow and easy quarter turn operation, the Jamesbury "Double-Seal" Ball Valve is a proven leader.

JAMESBURY CORP.,

64 NEW STREET, WORCESTER, MASS.

MATERIALS:

Jamesbury "Double-Seal" Ball Valves are available in Types 303, 316 and Alloy 20 Stainless Steels, Carbon Steel, Bronze, Ductile Iron, Monel, Aluminum and PVC. Other materials on special order. Interchangeable seats and seals are available in "Teflon", Nylon, Buna-N, Neoprene, Hypalon and natural rubbers.

Pneumatic, Hydraulic and Electric Motor Operators to fit Remote Control Requirements.

SIZES:

Screwed End: $\frac{1}{4}$ " through 3". Flanged: 150# series — $\frac{1}{2}$ " through 12", 300# series — $\frac{1}{2}$ " through 8".

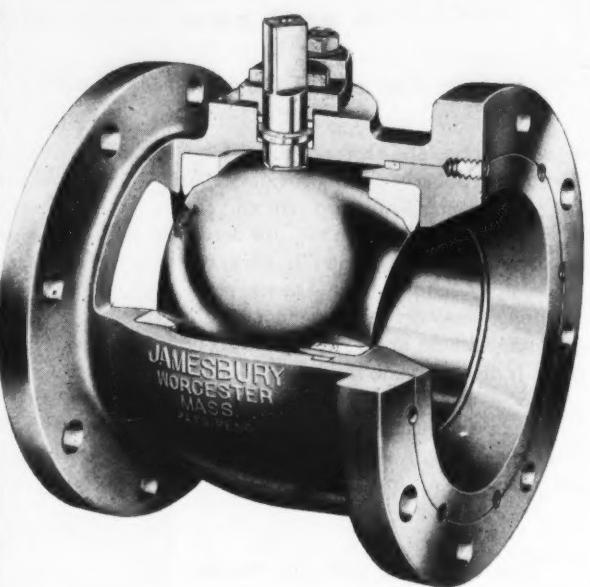
*10" and 12" on application

*600# series on application.

Check 2644 opposite last page.

664-6 © 1961 Jamesbury Corp.

"Double-Sure"



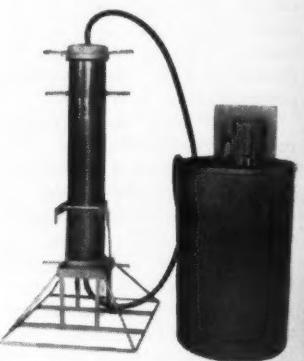
is liberated in form of heat.

Another characteristic of the torch is that none of its parts ever heat. The only component that will eventually have to be replaced is the relatively inexpensive electron tube or magnetron used to generate the electromagnetic field.

Among possible applications are: investigation of missile re-entry, spraying high melting point metals and ceramics, petroleum cracking, welding, etching, machining, chemical purification and processing.

(Plasma Torch is a development of Amperex Electronic Corporation, division of North American Phillips Company, Incorporated, 230 Duffy Avenue, Hicksville, Long Island, New York.)

Check 2645 opposite last page.



"Lost" gold recovered

. . . with a commercial unit designed to salvage precious metal ordinarily lost in electroplating.

The unit is attached to a tank into which the plated item is dipped. The pump continually circulates the solution to the special resin trap, where the gold is picked up. When the resin becomes saturated with gold, it may be burned and the gold reclaimed.

The device is designed for any acid or non-free cyanide golds. In the past, between 4 and 10% of all gold used in electroplating has simply gone down the drain.

(Gold Saver is being introduced by Technic, Inc., PO Box 965, Providence, R.I.)

Check 2646 opposite last page.

Highly Intimate Blends in 1 to 2 Minutes

Blends while discharging; No segregation or flotation

Sturtevant Rotary Blenders start 4-way blending while charging, continue it during discharge, thus producing highly intimate, even blends of dry and semi-dry materials — within 3 to 5 minutes of start of charging.

Six complete blending cycles per hour are common. And Sturtevant's special action produces no particle reduction, cleavage or attritional heat — is highly effective yet gentle and safe even with explosives.



Receiving

Scoops cascade material as drum rotates. Movement forces material from both ends to middle. Thus blending is 4-way right from start of charging.

Discharging



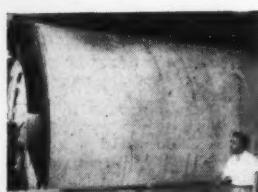
Self-cleaning, dust-sealed drum; one-man accessibility

Operation of Sturtevant Blenders is self-cleaning — drum interiors are completely dust-sealed. For inspection of all models, one man simply loosens a few lugs to remove manhole cover — quickly and easily.

Nine standard models with capacities to 900 cu. ft.



10 cu. ft. Sturtevant Blender at U.S. Steel Corp.'s new Applied Research Laboratory (Raw Materials Division) in Monroeville, Pa. This unit handles batches up to 500 lbs. — is ideal for pilot work and small runs.



One of four 450 cu. ft. Sturtevant Blenders at Celviver Plant of Celanese Corp. (Rock Hill, N.C.). These large units handle up to 20,000 lbs. batches — have a 9-year record of meeting the most exacting blending requirements.

Fully or semi-automatic, or manually controlled operation

Constructed of carbon steel, stainless steel or Monel metal, Sturtevant Rotary Blenders are engineered to fit each customer's needs — can be supplied with injector sprays and any desired control system.

For more on Sturtevant Blenders, request Bulletin No. 080B. (Bulletins also available on Mixers, Air Separators, Micronizers, Crushers and Grinders.) Write today. STURTEVANT MILL CO., 119 Clayton St., Boston, Mass.

Check 2647 opposite last page.

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processing and engineering data

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Film Coefficient for Liquids—Sieder-Tate

GEORGE M. MACHWART
Michigan College of Mining and Technology

Film coefficients are used in calculations of heating and cooling of fluids in pipe and tube. They are of various forms. One which is usually encountered is that of Sieder-Tate. This may be applied to wide range of liquids. Usual form is as follows:

$$\frac{H_D}{k} = 0.027 \left(\frac{D_G}{\mu} \right)^{0.8} \left[\frac{C \mu}{K} \right]^{\frac{1}{3}} \left(\frac{\mu}{\mu_w} \right)^{0.14}$$

where:
 h = film coefficient of heat transfer, Btu/(hr) (sq ft) ($^{\circ}\text{F}$)
 D = inner diameter of pipe, ft
 k = thermal conductivity, Btu/(hr) (ft 2) ($^{\circ}\text{F}$) (ft)
 G = mass velocity, lb/(hr) (sq ft)
 μ = viscosity of fluid, lb/(ft) (hr)
 μ_w = viscosity of fluid at pipe-wall temperature, lb/(ft) (hr)
 C = specific heat, Btu/(lb) ($^{\circ}\text{F}$)

Typical Example

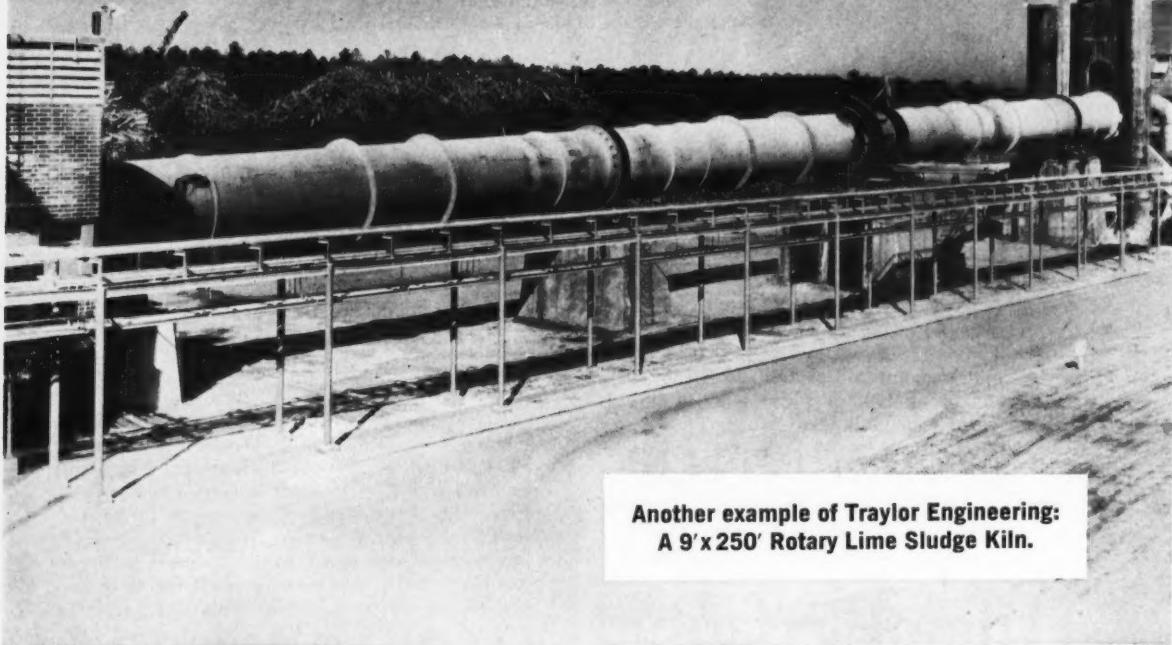
To use nomograph, draw straight line from 0.17 on k-scale to 0.1 on D-scale to intersect R₁. From intersection on R₁-scale, draw straight line to 1×10^6 on G-scale to intersect R₂-scale. From this intersection draw line to 1.0 on C-scale to cross R₃-scale. From this R₃-scale intersection pass line through R₄-scale to 10 on μ -scale. Finally, draw line from R₄-scale intersection to 100 on μ_w -scale. This will intersect h-scale at 205, or the correct value for coefficient of heat transfer for condition mentioned.

nomograph on page 125

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TRAYLOR KILNS

for the pulp and paper industry



Another example of Traylor Engineering:
A 9' x 250' Rotary Lime Sludge Kiln.



One of the most important advantages of Traylor Lime Sludge Kilns in pulp mill operations is their money-saving efficiency in recovering lime for reuse over and over again. This, plus Traylor's unexcelled heat recovery systems and thorough, experienced attention to engineering details, produces kiln installations that are notable for continuous service.

Write for Bulletin TKB-3 on Heat Recovery Systems, or Bulletin No. 1115 on Traylor Kiln installations.

TRAYLOR ENGINEERING & MANUFACTURING

DIVISION OF FULLER COMPANY

1552 MILL STREET, ALLENTOWN, PA.

Sales Offices: New York—Chicago—San Francisco
Canadian Mfr.: Canadian Vickers, Ltd., Montreal, P.Q.

Check 2648 opposite last page.

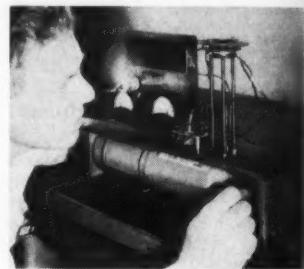
Thermoelectric generator doubles output using heat of thermionic converter

Study indicates feasibility of cascaded device

A combination thermionic-thermoelectric energy converter, without additional heat input, has produced twice as much power as a thermionic converter alone.

Using "waste" heat rejected by the thermionic converter, the thermoelectric generator produced significant boosts in both power output and efficiency.

In the developmental work, a production-type vacuum



thermionic converter was "sandwiched" with a zinc-antimonide constantan thermoelectric generator.

The thermionic converter, running at a cathode temp of 875°C, (below normal operating temperature) produced .2 watt. Simultaneously, the thermoelectric generator produced .34 watt at a hot-junction temp of 350° and a heat sink temp of 100°C. The heat source was propane gas.

The study, by I. T. Saldi of General Electric's Power Tube Department, indicates that efficiencies of 16% and better may be attainable using vapor thermionic converters operating at a cathode temperature of 1325°C, cascaded with lead telluride thermoelectric generators, operating at a hot-junction temperature of 650°C and heat sink temp of 75°C.

Cryogenic uses of a specially processed mineral-wool fiber insulation are described in Bul IN-311A—Johns-Manville Corporation.

Check 2649 opposite last page.

The Mastergauge



GROUP
and companion
"Master-test"
group for extreme
services requiring
the ultimate in ac-
curacy and stamina.

Right Quality



GROUP
also for tough ser-
vices, but less se-
vere than the condi-
tions served by the
"Mastergauge"

Gauge



Standard GROUP
for the general run
of gauge services.
Marsh quality and
accuracy at a mod-
erate price.

for every need

Within these three comprehensive Marsh groups you have the world's widest (yes, and wisest) selection of pressure gauges. These groups of gauges are not *grades*...they are *kinds*...the MARSH kind...which means that each gauge, within the scope of its rated use, is the **BEST** of its kind!

Pick the right Marsh Gauge and you have the best answer to your gauge problem.

Ask for latest data

MARSH INSTRUMENT COMPANY

Division of Colorado Oil & Gas Corpora-
tion, Dept. Z, Skokie, Ill. Marsh Instru-
ment & Valve Co., (Canada) Ltd., 8407
103rd St., Edmonton, Alberta, Canada.
Houston Branch Plant, 1121 Rothwell St.,
Sect. 15, Houston, Texas.

MARSH

GAUGES • THERMOMETERS
VALVES

Check 2650 opposite last page.

FEBRUARY 1961

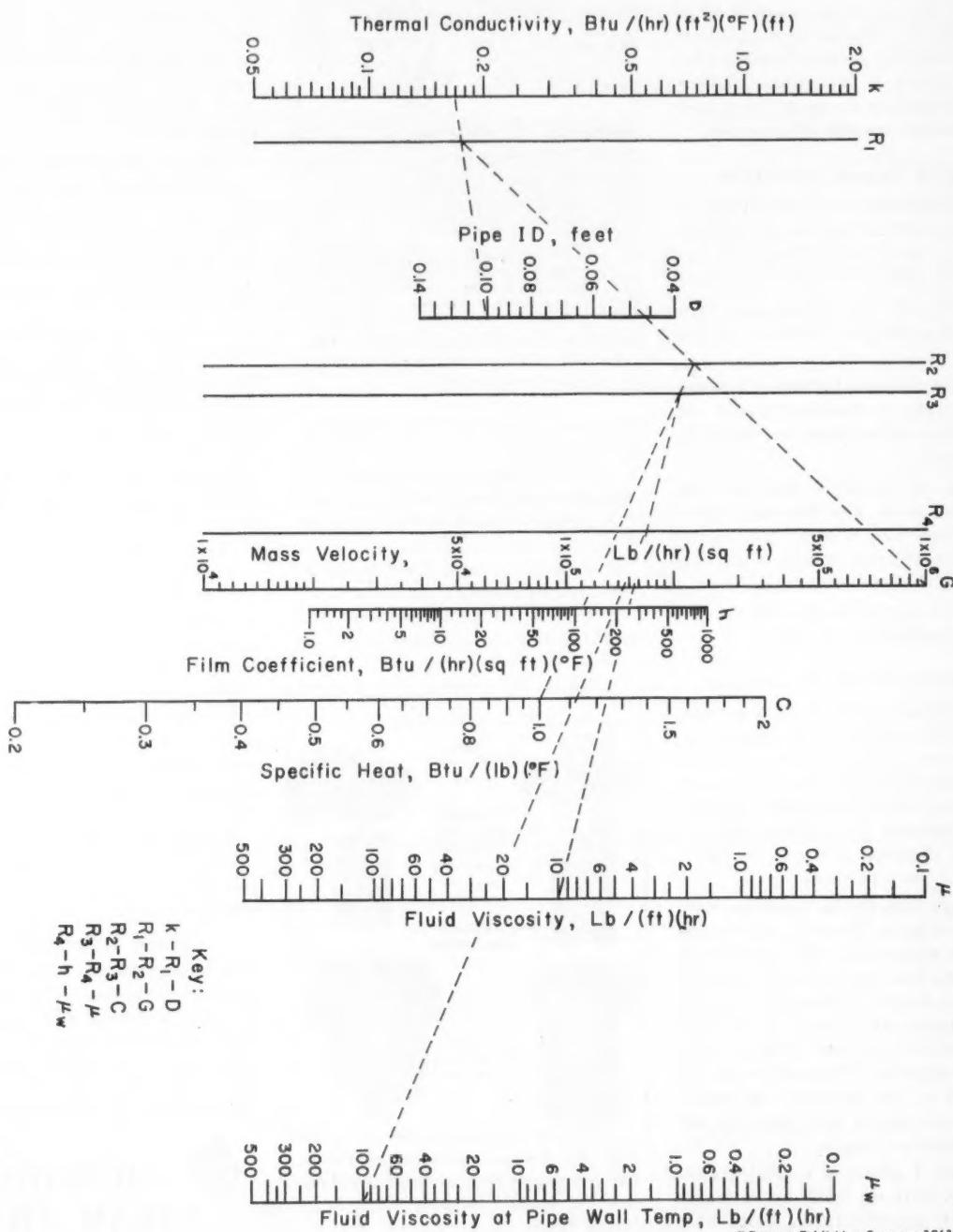


processing and engineering data

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Film Coefficient for Liquids-Sieder-Tate

From page 123



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Trapping Standardization

... steam trap standardization plus standardized hook-ups spell lower maintenance costs

An important weapon in the fight against rising maintenance costs is standardization. It can reduce the variety of maintenance problems and simplify those which remain.

Since we specialize in steam traps we'd like to offer some suggestions for a trapping standardization program. Such a program involves standardization on one make of trap and standardization of hook-ups.

Trap Standardization

The advantages of standardizing on a single make of trap are important and can make a big difference in the cost and ease of repairs because—

1. You can carry a more complete stock of repair parts with a smaller inventory.

2. Maintenance personnel has the opportunity to become expert on one make rather than be "jacks of all traps."

3. As an exclusive user of one make of traps you become a preferred customer of your trap representative and can be sure of getting the best possible service.

4. You can enjoy the advantages of standardized hook-ups.

Standardized Hook-ups

Standardized hook-ups facilitate and reduce the cost of both original installation and maintenance. By adopting standards for the dimensions of all fittings, including nipples, each hook-up for a given size of trap is identical and can be fabricated in the pipe shop.

Unions should be used so that when a trap needs repair, the unions can be uncoupled, the trap lifted from the line and a spare carrying identical length nipples and half unions slipped into place. In as little as a minute or two a faulty trap can be replaced. The faulty trap can go back to the storeroom for repair when convenient and then be put into stock as a spare.

Figure 1 shows a typical standardized hook-up used by a major chemical manufacturer. Note how

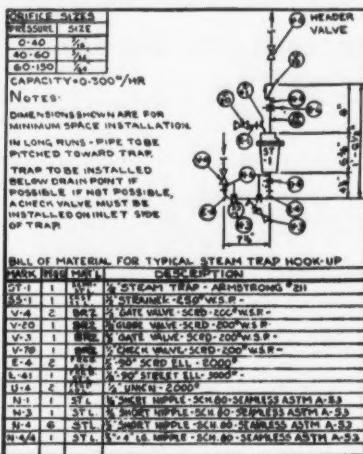


Fig. 1—Typical standardized installation hook-up used by a leading chemical manufacturer.

the hook-up provides the following advantages:

1. Test valve in trap cap permits fast, easy checking of trap operation.
2. Strainer ahead of trap protects it against dirt and scale.
3. Blowdown valve in strainer provides easy cleaning.
4. Check valve in discharge line isolates trap when test valve is opened.
5. Shut-off valves and unions



Fig. 2—Armstrong traps have only two moving parts—the lever assembly and the bucket. Nothing much to go wrong here.

Check 2651 opposite last page.

NEW LITERATURE Ideas and New Trends

Aromatic chemicals, balsams, gums and sundries, colors, citrus concentrates, essential oils, fixatives and flavors are among raw materials cited in Fritzche Price List — Fritzche Brothers, Inc.

Check 2652 opposite last page.

Nuclear accessories and related instruments, including remote handling equipment, bricks, shields, containers, radiation manikins and analyzers are illustrated and itemized in Cat C — Atomic Accessories Inc., Subsidiary of Baird-Atomic, Inc.

Check 2653 opposite last page.

Processes for production of wet process phosphoric acid and ammonium phosphate fertilizers, including di-ammonium, are presented in text and illustrations of 8-page Bul 160 — J. C. Carlile Corporation.

Check 2654 opposite last page.

Continuing service of information for people who have the responsibility of selecting pigments is offered with loose-leaf book which discusses pigments and their characteristics. Registration card in book entitles reader to receive subsequent bulletins. Technical Data Book—Holland Color and Chemical Company.

Check 2655 opposite last page.

Fossil-fuel resources are reviewed and the estimated rate at which they will be depleted in the absence of new energy sources considered in 63-page Atomic Energy Commission Report. "Fossil Fuels in the Future" (TID-8209), is available for \$0.75 from the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C.

Versatile binder (Syton 200) in the ceramic investment casting shell process is discussed in Bul I-199 — Inorganic Chemicals Division, Monsanto Chemical Company.

Check 2656 opposite last page.

Radiation emergencies and their control are subject of 100-page pamphlet, entitled "A Compendium of Information For Use in Controlling Radiation Emergencies." Publication, which summarizes lectures presented during a radiological business training course at Idaho Falls, Idaho, may be obtained by requesting TID-8206 (Rev.) and remitting \$1.00 to the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C.

**ARMSTRONG
STEAM TRAPS**



**handle acids
safely with . . .
JERGUSON
LINED GAGES**

Lined Gage shown with lined blind cover flanges.

CUT HERE AND FILE

WHERE concentration of liquids such as sulphuric, muriatic or other acids necessitates equipment with special linings, Jerguson can furnish you with reflex or transparent gages lined with natural and synthetic rubbers, lead, phenolic base compounds, Teflon, and other materials. Jerguson Lined Gages are designed to meet your requirements of long-life and dependable operation.

To meet your constantly increasing variety of demands, Jerguson engineers, working closely with the men in the Chemical and Petrochemical Fields, have developed a complete line of sound, dependable liquid level gages, valves, and specialties in various metals and synthetics to handle corrosive liquids and gases.

Jerguson Gages keep you out of trouble, and they save you time and money. Send for drawings GD-1306, 1307 on Lined Gages, or send your requirements.

JERGUSON

Gages and Valves for the
Observation of Liquids and Levels

JERGUSON GAGE & VALVE COMPANY
100 Adams Street, Burlington, Mass.
Offices in Major Cities

Check 2657 opposite last page.

FEBRUARY 1961

Vapor-liquid Equilibrium with Constant Relative Volatility

S. M. WALAS
University of Kansas

For many binary mixtures relation between compositions of liquid and vapor phases at equilibrium is expressed on basis of constant relative volatility:

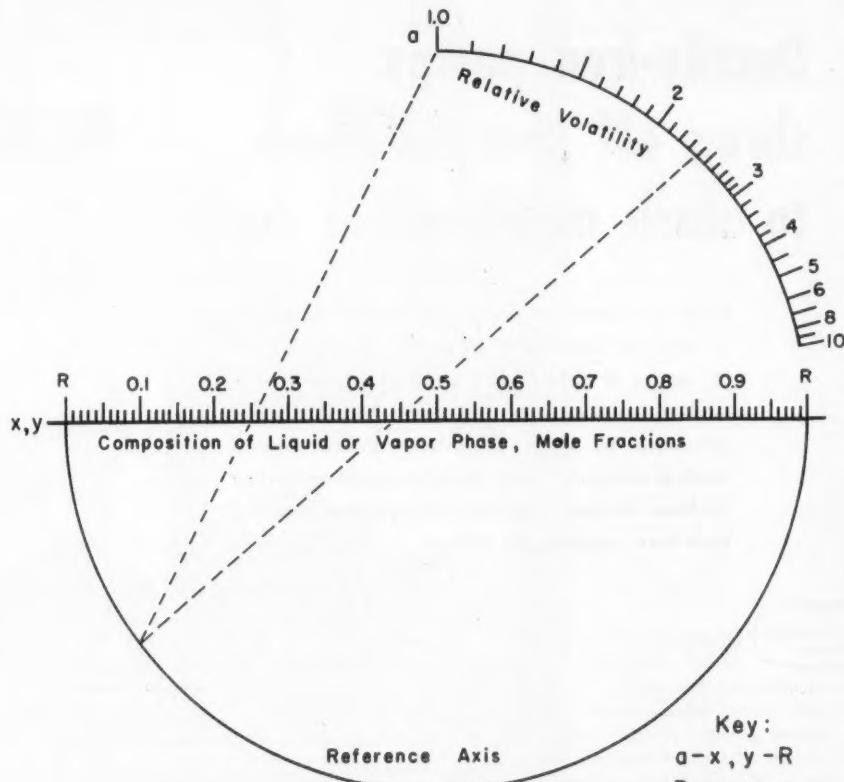
$$y = \frac{ax}{1 - x + ax}$$

where a is the relative volatility and x and y are the compositions of the liquid and vapor phases, respectively, in terms of mole fractions. Repeated solutions of this equation are accomplished conveniently with chart below which is constructed in accordance with theory of Bloomfield.

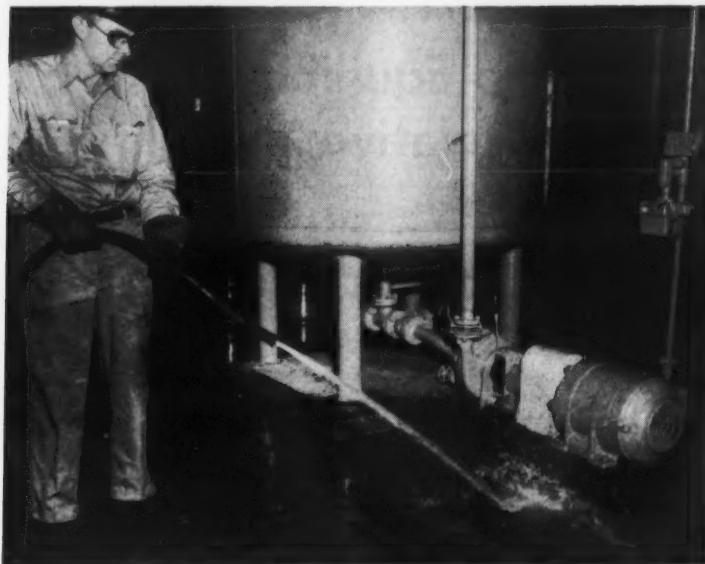
Typical Example

To locate a value of y corresponding to a given value of x at a particular relative volatility, construct a line through 1 on the a -scale and the numerical value of x on x,y -scale and find intersection with reference-scale.

Pivoting about this intersection, draw line to given relative volatility on a -scale. Intersection with x,y -scale then gives desired value of y . When $x=0.25$ and $a=2.4$, $y=0.44$. A complete $x-y$ diagram for distillation calculations may be obtained quickly in this manner.



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Ductile-iron centrifugal pumps withstand thermal-shock effects of cold-water splash from hose-down while handling materials at temperatures to 140°C

Ductile-iron pumps shrug off thermal shock to slash maintenance costs

Even in a chemical plant, cleanliness is usually next to Godliness—and for good reason in terms of equipment protection and personnel safety. Thus Du Pont faced a real dilemma at their Chambers Works when hosing-down of their organic-manufacturing section caused thermal-shock cracking of cast-iron centrifugal pumps.

A
NEW SOLUTIONS
FEATURE

Problem: Thermal-shock cracking and mechanical damaging of cast-iron centrifugal pumps were running up yearly maintenance tabs of as high as \$500/unit in the organic-manufacturing section in the Chambers Works of E. I. du Pont de Nemours & Company, Incorporated.

Pumps handled a variety of hot exotic materials, including benzene, hypochlorites and chlorinated solvents, at temperatures to 140°C. Some of these are flammable. In case of spillage, many represent personnel hazards or have serious corrosive effects on equipment and floors.

Because of the nature of

Sharpened Interest In Ductile Iron

Ductile iron has been attracting a growing amount of interest in the chemical processing industries — and understandably so. To the material's basic feature of excellent resistance to mechanical and thermal shock, add its secondary advantage of corrosion resistance, and it is easy to see why an investigation of its possibilities for many applications might well be warranted. Specifications of Type 60-45-10 ductile iron (ASTM A39556-T):

Mechanical Properties	Specified Minimum	Typical Range
Tensile strength, psi	60,000	60,000-80,000
Yield strength, psi	45,000	45,000-60,000
Elongation, % in 2"	10.0	10-25
Brinell hardness	—	140-190
Charpy impact, ft-lb (unnotched)	—	60-115
Creep strength @ 800°F, psi (1% extension in 10,000 hr)	16,000-27,000	

Stress Rupture, psi	Specified Minimum
100 hr/800°F	30,000-35,000
1000 hr/800°F	25,000-27,000
100 hr/1200°F	2200

Chemical Composition, %	Nominal	Typical Range
Total Carbon	3.6	3.4-4.0
Silicon	2.5	2.0-2.75
Manganese	0.3	0.2-0.6
Phosphorus	0.06	0.08
Nickel	—	0-1.0
Magnesium	0.05	0.02-0.07

materials handled, and in line with Du Pont's usual "good housekeeping" policy, the organic-manufacturing section was frequently hosed down. Resulting cold-water splashing oftentimes caused cast-iron pump casings to crack. In addition to this damage, pumps' lack of ductility also made them prone to mechanical damage.

Solution: Ductile-iron centrifugal pumps were installed to replace the cast-iron units. This move was preceded by test evaluation of a sample ductile-iron pump as follows:

Pump casing was heated to about 300°C with an acety-

lene torch and then drenched with cold water. Next it was hooked-up to steam at 165 psi and again drenched with cold water.

Only damage noted at this point was burning of suction-head gasket and packing by acetylene torch. After replacement of these, unit was successfully operated as a substitute for one of the cast-iron pumps. Test results indicated no cracking or warping of pump whatsoever.

Results: The ductile-iron pumps have required no maintenance other than normal lubrication. This has accrued a savings of up to \$500/year/

unit. The plant now has in service over 250 of these pumps . . . in one- to six-inch size range.

(Ductile-iron centrifugal pumps are product of Worthington Corp., Harrison, N.J.)

Check 2658 opposite last page.

► A NEW SOLUTIONS ARTICLE
**Furnace heat of 1000°F
fails to break-down
Insulating refractory**

Previous heat absorbent lasted only 6 months

At Cyanamid of Canada's Niagara Falls Plant, false ceiling of insulating refractory over each carbide furnace protects steel superstructure supporting three 40-ton electrode-hoist assemblies from 1000°F temperatures of furnace.

Heat-absorbing material formerly used required replacement at least every six months. Present insulating refractory has been in service since late in 1957 without need for replacement.

Material is a foamed fused-silica insulating refractory. It is 99% pure fused-silica glass. Foamed final state accounts for light weight of material



Carbide furnace produces 1000°F temperatures which have been absorbed for over two years by insulating refractory

(12 to 14 lb/cu ft). Cyanamid is now following policy of installing ceilings of this material over its other carbide furnaces as scheduled shutdown times occur.

(Foamsil insulating refractory is product of Pittsburgh Corn-ing Corporation, One Gateway Center, Pittsburgh 22, Pa.)

Check 2659 opposite last page.

Precisely controlled Radiant Heaters pre-heat plastic-coated paper/embossing without burning or scorching.

Sixlong Radiant Heaters form economical, highly efficient oven for curing extruded Teflon tubing.

Radiant heaters in hood cure centrifugally molded glass fiber reinforced torpedo tubes.

Ten radiant heaters automatically controlled for flexible, uniform vacuum forming.

EDWIN L. WIEGAND COMPANY
7517 Thomas Boulevard • Pittsburgh 8, Pa.
CHurchill 2-6400

Dial your exact temperature . . .

CHROMALOX

ELECTRIC RADIANT HEATERS

fast, uniform, economical, safe

Here's high-intensity heat . . . adjustable from 4 to 100% of heating capacity by fingertip control. Different zones of heat intensity can also be set up . . . by arranging heaters in different "banks" with individual controls for each.

Chromalox Far-Infrared (long wave length) is absorbed almost equally fast by all colors, textures and surfaces . . . including clear glass, plastics, cellophane.

For heating, baking, drying, curing, pre-heating, dehydrating, pre-expanding.

Space-saving, non-breakable, all-metal units withstand knocks, bumps, vibration. Moisture-resistant terminals available. No fumes, flames, glare or leaky pipes. Standard heating lengths to 150 inches. Immediate delivery from stock. Low-cost installation and operation. You can build production line heating tunnels, ovens, banks right on the job.

Write for Bulletin G62. Or, for fast action and on-the-job assistance with your heating problem, call your Chromalox Man listed below.

51874

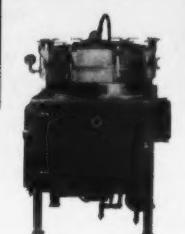
Call Your Chromalox Man for Heating Answers

- ALBANY, N.Y.
Hobart 3-0626
- ATLANTA, GA.
Trinity 5-7244
- BALA-CYNWYD, PA.
Mohawk 4-6113
Greenwood 3-4477
- BALTIMORE, MD.
Hopkins 7-3280
- BLOOMFIELD, N.J.
Edison 8-6900
N.Y.: Worth 4-2990
- BOSTON, MASS.
See "Wellesley Hills, Mass."
- BUFFALO, N.Y.
TT 6-4000
- CHARLOTTE, N.C.
Edison 4-4244
Franklin 5-1044
- CHATTANOOGA, TENN.
Amherst 5-3862
- CHICAGO, ILL.
Harrison 7-5644
- CINCINNATI, OHIO
Trinity 1-0603
- CLEARWATER, FLA.
446-7706
- CLEVELAND, OHIO
Prospect 1-7112
- COLUMBUS, OHIO
Amherst 7-8260
- DALLAS, TEX.
Riverside 8-9004
- DAVENPORT, IOWA
326-5233
- DENVER, COLO.
Glendale 5-3651
Genesee 3-0821
- DES MOINES, IOWA
Cherry 3-1203
- DETROIT, MICH.
(See Southfield, Mich.)
- HOUSTON, TEX.
Capitol 5-0356
- INDIANAPOLIS, IND.
Melrose 5-5313
- KANSAS CITY, MO.
Victor 2-3306
- LOS ANGELES, CAL.
Ludlow 9-6321
- MIDDLETOWN, CONN.
Diamond 6-9606
- MILWAUKEE, WIS.
Broadway 1-3021
- MINNEAPOLIS, MINN.
Federal 6-6631
- NASHVILLE, TENN.
Cypress 2-7016
- NEW YORK CITY, N.Y.
(See Bloomfield, N.J.)
- OMAHA, NEB.
341-7600, 7610
- PHILADELPHIA, PA.
(See Bala-Cynwyd, Pa.)
- PITTSBURGH, PA.
Emerson 1-2900
- PORTLAND, ORE.
Capitol 3-4197
- RICHMOND, VA.
Atlanta 8-8758
- ROCHESTER, N.Y.
Hamilton 6-2070
- ST. LOUIS, MO.
Chestnut 1-2433
- SAN FRANCISCO, CALIF.
Underhill 1-3000
- SEATTLE, WASH.
Main 4-7297
- SOUTHFIELD, MICH.
Kenwood 8-2100
Elgin 7-0677
- SYRACUSE, N.Y.
Granite 4-3933
- WELLESLEY HILLS, MASS.
Cedar 5-8040
- WICHITA, KAN.
Amherst 2-5647
- EXPORT DEPARTMENT
1010 Schaff Building
Philadelphia (2), Pa.
Locust 4-4020

Check 2660 opposite last page.

**YOU GET Lower
VACUUM PUMP
MAINTENANCE Costs
and
INCREASED VACUUM
with the**

**HILCO
OIL
RECLAIMER**



HILCO
OIL
RECLAIMER

For complete oil reclaiming. Removes solids, acids and volatile impurities; moisture, solvents, gases, etc. by heat-vacuum process.

A simple, economical and efficient method of restoring contaminated lubricating and sealing oil to the full value of NEW OIL. The HILCO will produce and maintain oil free of solids, water, gums and acids in a continuous, all-electric, automatic operation.

★ Be Sure of CLEAN OIL in
Your High Vacuum Pumps

**KEEP YOUR HYDRAULIC
SYSTEM Clean with
HILCO HYDRAULIC
OIL FILTERS**

- No More Varnish and Sludge Deposits
- No More Flushing and Manual Cleaning
- No More Frequent Oil Changes
- No More Accumulation of Dirt

Filter life up to a year eliminates usual frequent draining, refilling of systems.

★ Write for complete details in the free bulletin at no obligation . . .



The HILLARD Corporation
58 WEST FOURTH ST. ELMIRA, N.Y.

In Canada:
UPTON-BRADEEN-JAMES LTD.

Check 2661 opposite last page.

PLANT ENGINEERING, SAFETY
AND FLUIDS HANDLING

Specifying finishes for raised-face steel flanges

H. H. GEORGE

Tube Turns Division
Chemetron Corporation
Louisville

WHAT TYPE of gasket-surface finish is best for raised-face steel flanges? The key to such a selection lies in providing a sufficiently high unit compression to give an adequate seal without excessive bolt load. This, in turn, is influenced by the extent to which the gasket must flow to fill minute imperfections of contact surface.

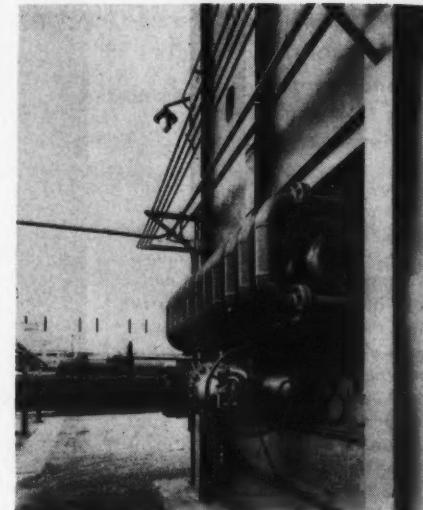
Six Commercial Finishes Are Available

There are six commercially available finishes for steel flanges: modified-spiral-serrated, spiral-serrated, concentric-serrated, fine-tool, smooth-plane and cold-water.

Modified-spiral-serrated (phonographic) finish is fairly standard. It consists of a continuous-spiral groove produced by machining with a round-nose tool. For flanges 12" and smaller, a 1/16"-radius tool is used at a feed rate of approximately 1/32" per revolution. Flanges 14" and larger are machined with a 1/8" tool at 3/64" per revolution.

Result of this is a shallow "U" groove with crests of uniform height and sharpness. This finish is satisfactory for all types of flat-ring non-metallic and spiral-wound-metal asbestos-filled gaskets, for most service conditions.

Spiral-serrated and **concentric-serrated** finishes have a "V" cross-section generated with a 90° included-angle or form tool,



Furnace installation in Texas chemical plant

producing grooves 1/64" deep and spaced 1/32" apart. Spiral-serrated finish has a continuous groove, while concentric-serrated type is made up of a series of concentric grooves.

These finishes are normally specified as alternates for the standard serrated (phonographic) finish by users who feel that they give greater assurance of ease in securing and maintaining a tight joint.

The concentric serrations have some possible advantage for hard gasket materials such as flat Monel, stainless-steel or carbon-steel gaskets, but none for the usual non-metallic gaskets.

Fine-tool (commercial-smooth) finish may be produced by combination of tool

To page 132

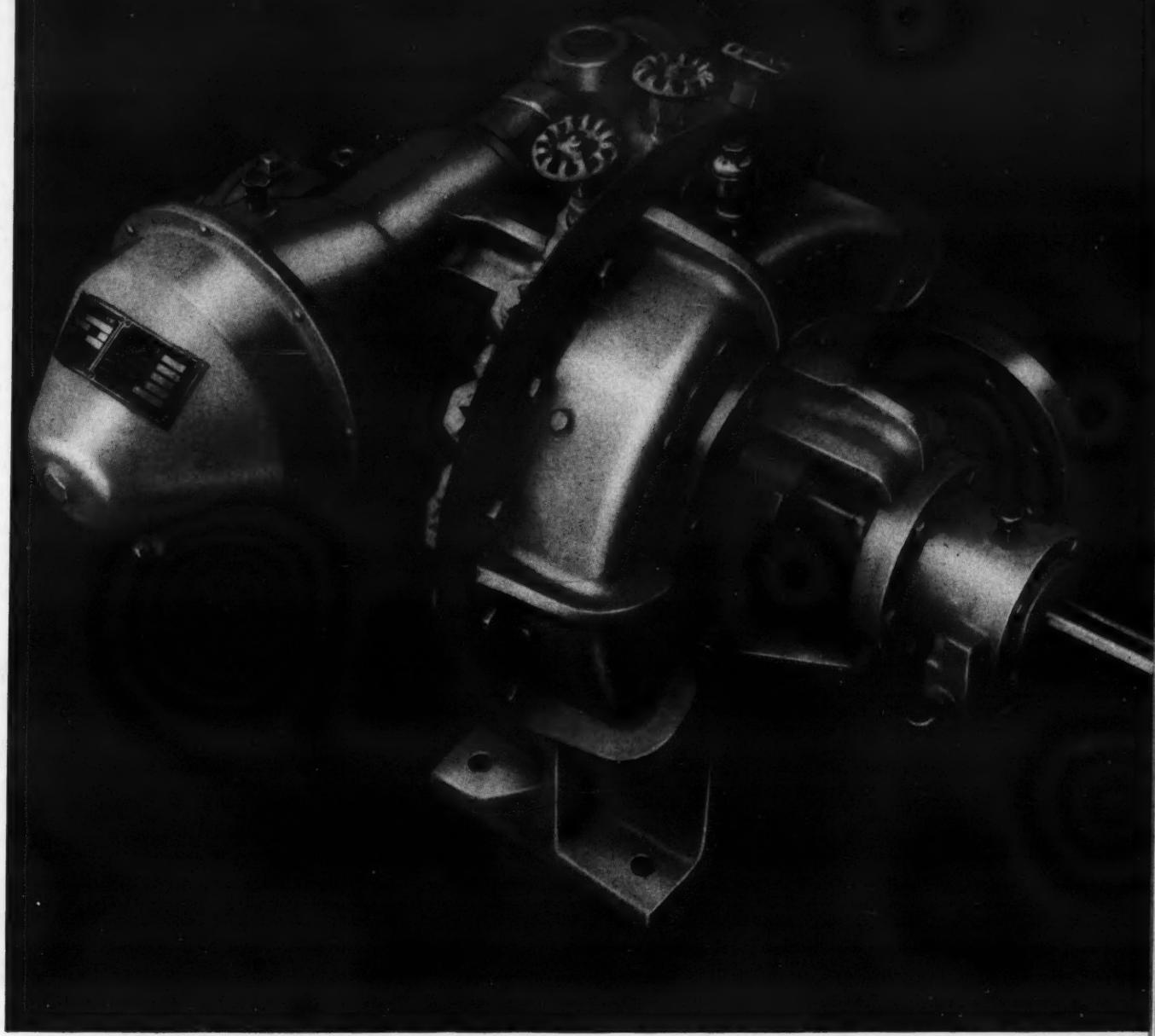
Finish Selection Guide

Type of Gasket	Suggested Finish
Flat non-metallic*	Modified-spiral-serrated
Spiral-wound-metal, asbestos-filled	
Steam, water, normal usage	Modified-spiral-serrated
Volatile-fluid services	Fine-tool
Flat solid-metal*	Concentric-serrated
Metal-jacketed asbestos-filled	
Corrugated solid-metal	Smooth-plane
Profile-serrated solid-metal	Smooth-plane
	Cold-water or smooth-plane

* Gasket should have a thickness of at least three times the depth of the grooves.

COPPUS

BLUE RIBBON PRODUCTS



Coppus Horizontal Steam Turbine

NEW RUGGED DESIGN—BLUE RIBBON RELIABILITY!

Here's a new dimension in turbine performance! Coppus brings you a new rugged stability of design . . . a new measure of reliability in a complete range of power-packed turbines, from 1 HP to 250 HP — marked with the Blue Ribbon only after each is precision made . . . precision tested. Performance features like these assure you Blue Ribbon Reliability —

A totally enclosed governor . . . totally enclosed, independently operated safety trip . . . easily replaceable packing and bearings . . . multiple steam nozzle control . . . brake rim for added safety . . . wide bucket "L" type wheel (optional) for minimum water rate.

For
more information
on product at
right, specify 2662
see information
request blank
opposite last page.



Coppus Turbines are built to customers' specifications, including API and NEMA standards. All Coppus Products carry the same Blue Ribbon assurance of reliable performance. For further facts on turbines, send for new Catalog 200. COPPUS ENGINEERING CORPORATION, 382 Park Avenue, Worcester, Mass. Sales Offices in Thomas' Register.

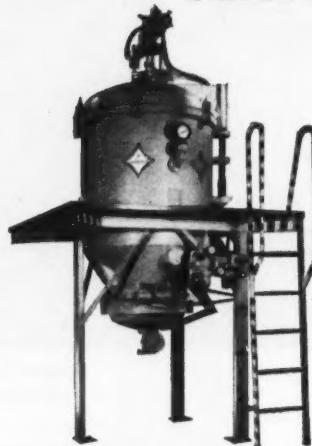
COPPUS
STEAM TURBINES

SAVE TIME and EFFORT WITH MODERN FILTERS



**Just flip the lid
...WHAM...
cake removed**

These rapid cleaning devices on INDUSTRIAL filters offer tremendous advantages to the user through removal of, and subsequent disposing of waste materials or recovery of valuable solids.



For additional information write for Bulletin EP-100.

INDUSTRIAL

PRESSURE FILTERS • ION EXCHANGERS • CORROSION TEST CABINETS • PUMPS • WATER & WASTE-TREATING EQUIPMENT

Check 2663 opposite last page.

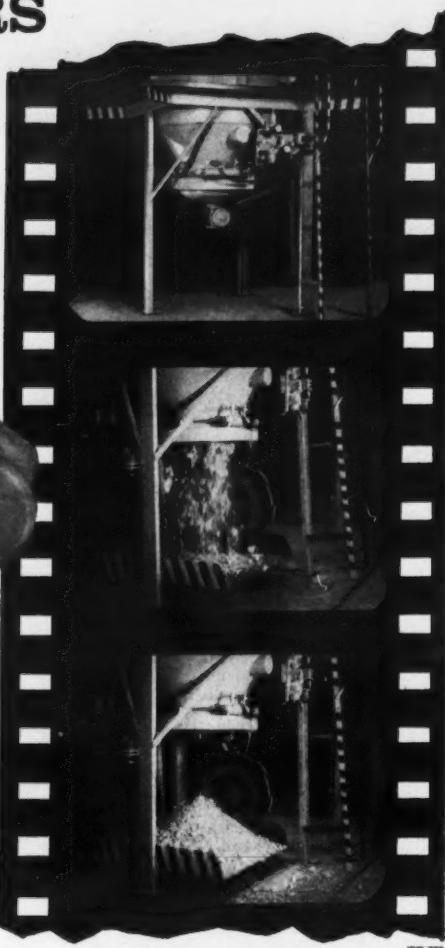
ENGINEERING & SAFETY

shape, depth of cut and cross feed. Good practice results in groove depth of approximately 0.005" with 80 to 100 serrations per inch.

This finish is specified for use with spiral-wound-metal asbestos-filled gaskets for helium, hydrogen and other difficult-to-hold volatile fluids. It is also sometimes specified for corrugated-metal gaskets.

Smooth-plane and cold-water finishes are produced by using a wide, formed tool at high speeds. The smooth-plane finish is essentially a flat surface with a 125-microinches (RMS) or finer finish.

The cold-water type is still a finer finish corresponding to 63 microinches (RMS) or finer. The finest finish normally furnished is 32 microinches (RMS). These mirror-like finishes are recommended when profile solid-metal (grooved-metal) or corrugated-metal gaskets are required. These, too, are premium finishes.



Tape pipe dope

With VIBRA-SHOC or RECIPRO-SHOC, cleaning of your INDUSTRIAL filter is completed in minutes. The above mentioned trade named devices are obtainable on INDUSTRIAL'S TYPE 152 filters, as are such optional equipment as QUICK OPENING COVERS, LIQUID SHOC and AIR WASH, all designed with the efficiency you require for your particular operation. All these mechanical aids work for you to realize a definite cost savings based on reduced downtime, for either continuous or batch type operation. These self-cleaning devices also eliminate the manual dirty work in handling any dry, wet or semi-solid material.

INDUSTRIAL FILTER & PUMP MFG. CO.
5908 West Ogden Avenue, Chicago 50, Illinois

... is recommended for joining metal, plastic, ceramic, rubber, and other pipe materials. Tape dope will withstand temperatures in range of -300 to +500°F. It can be used for pipe carrying materials of all types. Tape is available in pocket-sized 240- and 480-inch rolls.

(Pipe-Pac is product of Johns-Manville Corporation, 22 E. 40th St., New York 16, N.Y.)
Check 2664 opposite last page.

THAT'S
INTERESTING

**Sound vs.
X-rays**

A device which utilizes sound energy and presents the results on electro-sensitive paper may replace X-rays for many inspection jobs.

The device, called the Acoustigraph, transmits sound energy through low density materials such as concrete, plastic, rubber and wood.

Where less sound energy penetrates the inspected object, a dark area appears on the paper. This dark area represents a flaw.

According to the developer, Reed Research, Inc., Washington, D.C., the Acoustigraph is 30 times as sensitive as X-ray methods.

For more information on product at right, specify 2665 see information request blank opposite last page.

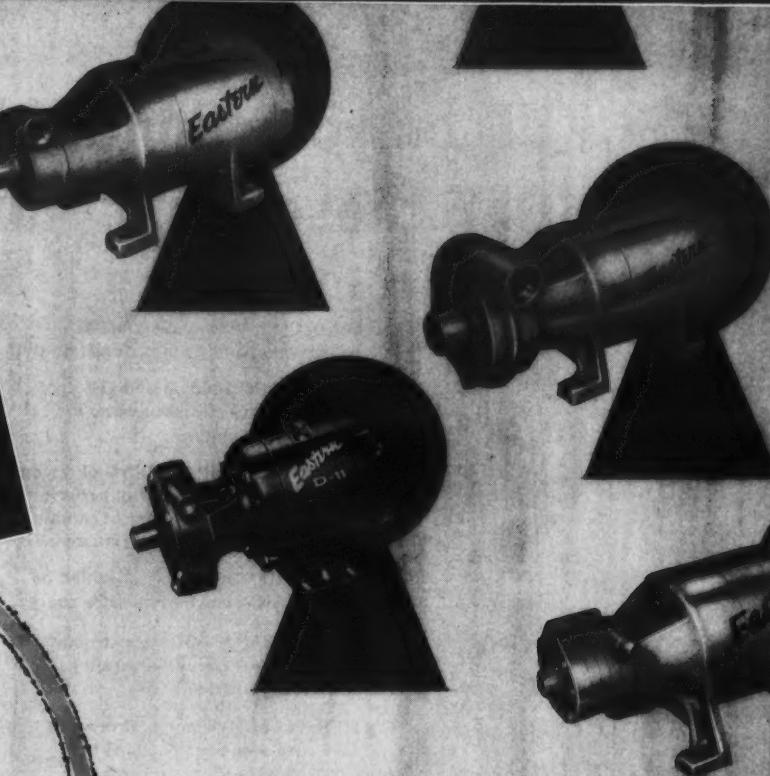
Eastern



**INDUSTRIAL
CENTRIFUGAL
PUMPS**

BULLETIN
NO. 130

**your key
to the perfect
choice of
CENTRIFUGAL
PUMPS**



A new catalog opens wide the doors to designers of process equipment — tells all you need to know in terms of engineering data, performance charts, seals, metals, mountings!

If you need centrifugal pumps with these characteristics, this reference book is for you:

- **PRESSURES:** to 21 psi in single stage pumps; to 70 psi in multi-stage types.
- **FLOWS:** capacities to 70 gpm in single-stage pumps, to 10 gpm for multi-stage models.
- **MOTORS:** standard motors for 115/230 volts 60 cycles 1 phase (other electrical characteristics available). Power range from $\frac{1}{8}$ to $1\frac{1}{2}$ H.P.
- **ENCLOSURES:** drip-proof, totally enclosed, and explosion-proof ballbearing frames.
- **DRIVES:** Space-saving close coupled pumps most rugged and popular. Pedestal mounted arrangement without motor available as alternate for belt or coupling drive.
- **SEALS:** a variety of rotary seals and stuffing boxes, to fit every application.
- **METALS:** your option of cast iron, bronze, stainless steel, Monel, Cast Iron, Hastelloy "C".
- **INSTALLATIONS:** a wide range of transfer, recirculation, feed, boost and other pumping applications.

All told, 50 different models are described in full — and you get a wealth of technical data as well. Write for new catalog 130 now!



**EASTERN
INDUSTRIES,
INCORPORATED**

100 SKIFF STREET, HAMDEN, CONN.
WEST COAST OFFICE 4203 Spenser St., Torrance, Calif.

CHECKUP on your Control Valves... CHECKOFF these Annin Advantages *

Providing the optimum in design and performance features

MINIMUM PARTS and simplicity of construction in Pneumatic Position Unit.

THREE POINT guiding and self lubricating seals in pneumatic piston actuators.

ADJUSTABLE TOP LOADING of piston permitting optimum control performance over maximum range of conditions on pneumatic positioning actuator.

BODY ORIENTATION as specified on any three-way valve at no extra charge.

CORNER VALVE BODY construction $\frac{1}{2}$ " through 2" in all body ratings converted on job site.

WIDE SELECTIVE range of reduced port (Pee Wee construction) trim available with CV ranges 2.5, 1.5, 1.0, 0.60, 0.25, 0.10, .063, .040, .025, .016, .010, at no extra charge.

REDUCED PORTS stepped down three or more sizes interchangeable in all models.

MINIMUM CV available of .000001.

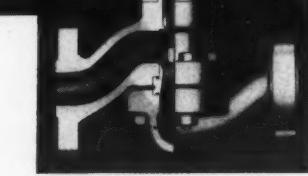
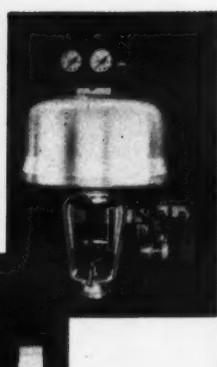
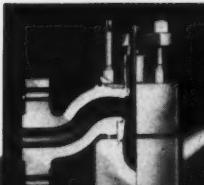
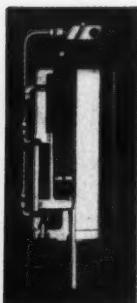
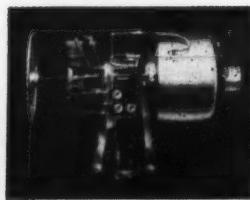
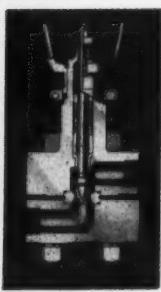
NO EXTRA CHARGE for reduced ports in any model 1 inch and under.

SOFT SEAT construction for guaranteed bubble tight shut off available in all models at minimum cost.

WIDE CHOICE of special body gasketing for all applications within temperature-pressure limitations of any valve.

TEFLON CHEVRON packing standard on all valves. Other types on request.

SPLIT BODY CHECK VALVE available in all body sizes and ASA ratings.



Annin

VALVES THE ANNIN COMPANY
1040 South Vail Avenue
Montebello, California

Check 2666 opposite last page.

► A NEW SOLUTIONS ARTICLE
High-temp incineration blows the whistle on air pollution

Still-bottom sludge burned is mostly styrene wastes

Problem: Burning-off of still-bottom sludge (consisting of mostly styrene wastes) caused serious air-pollution condition for large midwestern chemical and plastics producer.

Solution: A standard incinerator unit and a pressure



Incinerator installation shown here has been highly successful in virtually completely burning-off still-bottom sludge (consisting mostly of styrene wastes) to eliminate what had been serious air-pollution problem

blower was installed to burn wastes. Blower is driven by 15-hp electric motor which operates at 3600 rpm. Air pressure provides for atomization of heavy sludge; atomization gives more efficient burning.

Waste material is trucked to incinerator location in a trailer-mounted 1500-gal heated mobile storage tank. The unit is complete with self-contained pumping system and 150-gal flush-out tank. Latter is used to flush lines with mineral spirits after burn-off step.

Quick-disconnect couplings permit rapid hook-up of mobile tank to incinerator. Burner is equipped with flame-out detection device. This is installed in series with safety shut-off switch. Entire system is located adjacent to sheet-metal shed, providing neces-

sary weather protection for personnel.

Heating of sludge is essential because of extremely high temperature: viscosity ratio of material. Accordingly, sludge is normally pumped at 140°F—a temperature determined (by experimental and on-the-job testing) to be best compromise of economy of operation and incinerator performance.

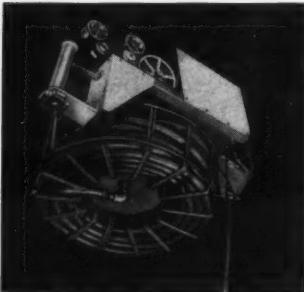
Results: Air pollution is no longer a problem. Because incineration is accomplished at high temperatures, burn-off is virtually complete.

(Incinerator used in above-described installation is product of Preco Manufacturing Co., 2605 W. 14 Mile Rd., Royal Oak, Mich.)

Check 2667 opposite last page.

Ceiling or wall locale of powered hose reel saves floor space

Recently developed hose reel is powered by a 1/3-hp electric motor. The reel may be wall- or ceiling-mounted to save plant floor space. Six aluminum rollers pay-out and take-up hose at rate of 100 fpm or more. Reel capacities



Ceiling-mounted electric-powered hose reels servicing area floors may be operated from pendant-controlled valves

are 50 to 500 ft, depending on hose size. Ceiling-mounted reels servicing area floors may be operated from pendant-controlled valves.

(Zierco hose reel is product of Zierden Company, 3815 S. Kinnickinnic Ave., Milwaukee 7, Wis.)

Check 2668 opposite last page.

Most accurate of all mechanical variable speed drives:

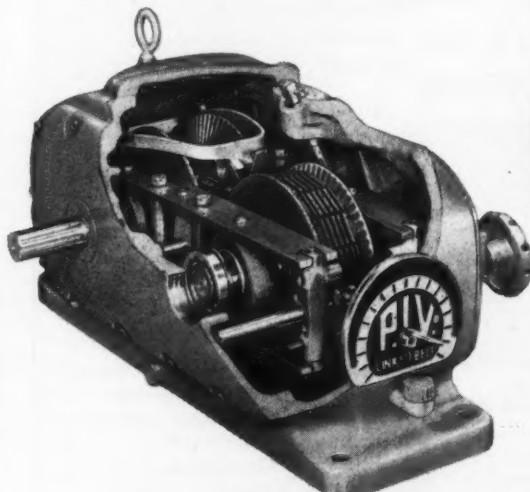
positive Infinitely Variable

For stepless, slipless speed changing, there's nothing like Link-Belt P.I.V.—the *only* chain-driven variable speed drive.

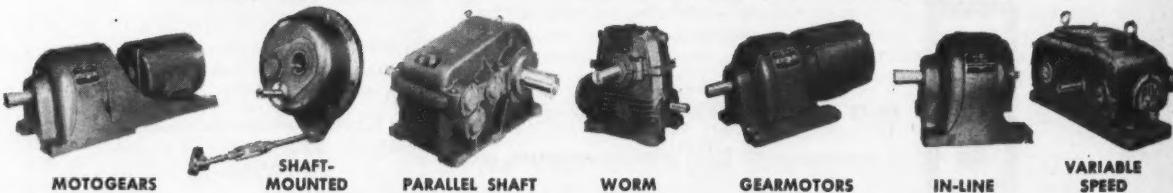
With P.I.V., teeth—not tension—assure positive, high-efficiency power transmission. You can select any speed in its range—find it instantly, hold it indefinitely. The exclusive all-metal, self-tooth-forming chain meshes with radially grooved wheels . . . maintains positive, nonslip contact at any speed under all loads.

P.I.V. drives are fully enclosed . . . unaffected by atmospheric conditions. They're available in 8 sizes, 16 standard types, capacities from $\frac{1}{2}$ to 25 hp. Type RS is available in capacities up to 50 hp.

For full details, ask your Link-Belt district sales office or authorized stock-carrying distributor for Book 2274. You'll find them in the yellow pages of your local phone directory under Power Transmission Equipment.



LINK-BELT has the right reducer for every need, every speed



Check 2669 opposite last page.

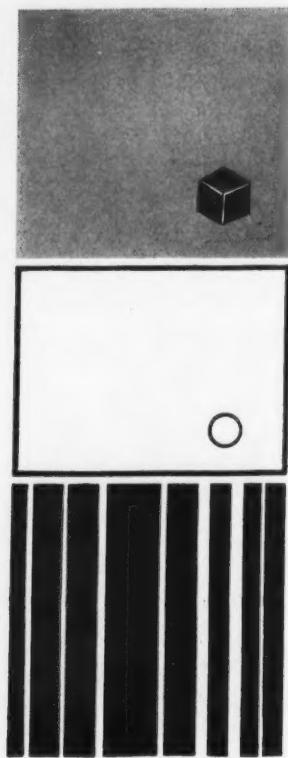


INSTANT SPEED CHANGING is achieved by simply turning handwheel to desired position on easy-to-read dial. P.I.V. drives are also available with electric, pneumatic or hydraulic controls. Here P.I.V. drive and Link-Belt roller chain accurately regulate speed of rolls in roller-hearth furnaces used to heat-treat jet engine parts.

LINK-BELT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, São Paulo; Canada, Scarborough (Toronto 13); South Africa, Springs. Representatives Throughout the World.

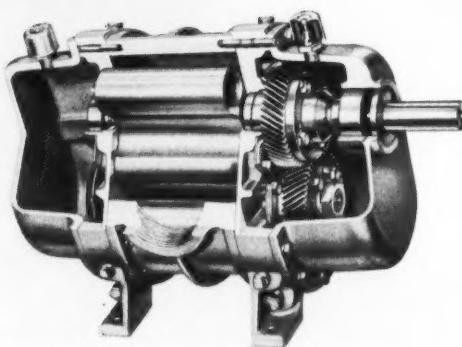
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**SMALLEST CUBE
DIMENSIONS**

**LIGHTEST
WEIGHT**

**WIDEST
PRESSURE RANGE**



WITH M-D 3-LOBE BLOWERS

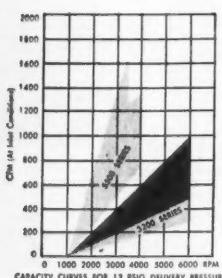
If space and weight of the blower is a concern in your design problem, consider this fact. M-D rotary positive blowers because of their unique 3-lobe design require smaller cubic space than any other blowers. A survey shows that a 14 PSI M-D takes 3/4 to less than 1/10 the space of competitive models . . . and in some cases are only 1/10 the weight.

M-D Blowers operate at wider pressure and speed ranges than any other rotary positive blower. Capacities of 30 production models range from 30 to 4000 CFM, pressures to 15 PSIG single, 70 PSIG multi-stage.

For full information write

M-D BLOWERS, INC., RACINE, WISCONSIN

A SUBSIDIARY OF  MIEHLE-GOSS-DEXTER, INC.



Check 2670 opposite last page.

ENGINEERING & SAFETY



Smokestacks in color

. . . are made of steel protected by permanent glass for corrosion protection. Green, red, gray, tan, brown, black, light-blue and royal-blue colors are available.

Glass protection eliminates need for painting. Smokestacks are available in variety of sizes. Typical section is 20' long. Stack diameters range to eight ft, in six-inch increments.

(Glass - protected smokestacks are product of Atomic & Process Equipment Division, A. O. Smith Corporation, Milwaukee 1, Wis.)

Check 2671 opposite last page.

Silicon rectification given electrostatic precipitators by conversion units

Uses: Conversion of existing equipment to silicon rectification.

Features: Silicon rectifier is especially designed for use on electrostatic precipitators now using mechanical types.

Description: Conversion unit utilizes all existing equipment with exception of rectifier motor, disc, shoes, suppressor elements and pedestal. It ties in with present AC connections and DC switchgear which distributes rectified power.

Silicon rectifier has no moving parts. Complete replacement can be accomplished in six to eight man-hours. All parts of both old and new rectifiers may be handled by one man, and no rigging is required in making changeover.

(Silicon rectifier is product of Buell Engineering Company, Inc., 123 William St., New York, N.Y.)

Check 2672 opposite last page.

Now he can

Escape

Rheumatic Fever



Medical science has scored against a major childhood menace. Rheumatic fever and rheumatic heart disease now can be prevented through prompt treatment of "strep" infections.

TO SAFEGUARD YOUR CHILD —

if he has a bad sore throat, call your physician — especially if there is a high fever, swollen neck glands, difficulty in swallowing, nausea or vomiting.

**For medical advice,
see your doctor.**

**For more information,
ask your Heart Association.**

**For greater advances
against heart disease,**

**GIVE
to your
HEART FUND**





SAFETY SLANTS



Lightweight protection

... for the head is provided by cap made of impact-resistant plastic in white and yellow. A top-lining of foam cushions blows, while foam sweatband holds cap on head.

(Bump cap is product of E. D. Bullard Company, 2680 Ridge-way, Sausalito, Calif.)

Check 2674 opposite last page.

men. Each booklet is for a one-hour training session. Leader's manual tells how to set-up meetings and apply material to individual plant location.

(Further information about "Men and Motives in Safety Supervision" is available from National Safety Council, 425 N. Michigan Ave., Chicago 11, Illinois.)

Check 2676 opposite last page.



Sanitation and safety

... is through-conduit ball-type unit designed to close automatically in case of abnormal line-pressure changes. Only one pilot is used for high- and low-pressure control. Accuracy of valve is to within $\pm 1\frac{1}{2}\%$ of predetermined settings.

(Flow line safety valve G is product of Otis Engineering Corporation, 6612 Denton Drive, Dallas 35, Tex.)

Check 2675 opposite last page.

Training for safety

... is subject of series of six text booklets entitled, "Men and Motives in Safety Supervision" and a manual for discussion-group leaders.

Course is designed for fore-

... requirements are both met with milled Neoprene gloves. The white gloves have a red satinized lining. They are designed with an embossed non-slip grip. Fingers and hand areas are of curved, contour design.

(Stanzoil N-37 White cap gloves are product of The Pioneer Rubber Company, 296 Tiffin Road, Willard, Ohio.)

Check 2677 opposite last page.

Safety in handling hazardous materials is illustrated and described in catalog treating complete control cabinets. Complete control technique for every type of procedure in fields of research, experimentation testing and processing are discussed in 28-page booklet. Cat 233—Hamilton Manufacturing Company.

Check 2678 opposite last page.



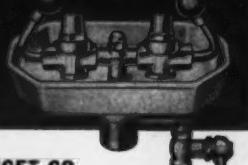
SPLIT SECOND SAFETY

IN EMERGENCY... contaminated eyes are instantly cleansed of dangerous particles and chemicals by controlled water streams from HAWS Emergency Eye-Wash Fountains. This "split second safety" before medical aid arrives can mean the difference between temporary eye irritation and permanent eye injury! HAWS will provide emergency facilities best suited for your safety program—minimizing hazards, reducing claims, lowering insurance costs. Get the facts by writing today for illustrated literature!

HAWS EYE-WASH FOUNTAINS

MODEL 7100
(old model 8930)

Basic eye-wash model with enameled iron bowl; quick opening valve for manual operation; adaptable to treadle operation; chrome plated brass water pressure regulators and twin fountain heads. Wall mounted and pedestal models available.



HAWS DRINKING FAUCET CO.

Since 1909
1443 FOURTH STREET
BERKELEY 10, CALIFORNIA

EXPORT DEPARTMENT: 19 Columbus Avenue, San Francisco 11, California, U.S.A.
Check 2679 opposite last page.

WE WEAVE ACCURATE "WORKING OPENINGS"



IN WOVEN WIRE SCREEN AND WIRE CLOTH PRODUCTS

Whether you are grinding, sizing, scalping, dewatering or filtering it's the accuracy of the "working opening" that makes the difference in woven wire screen and wire cloth products. We pride ourselves in weaving accurate "working openings", an engineered screening surface to meet your specification.

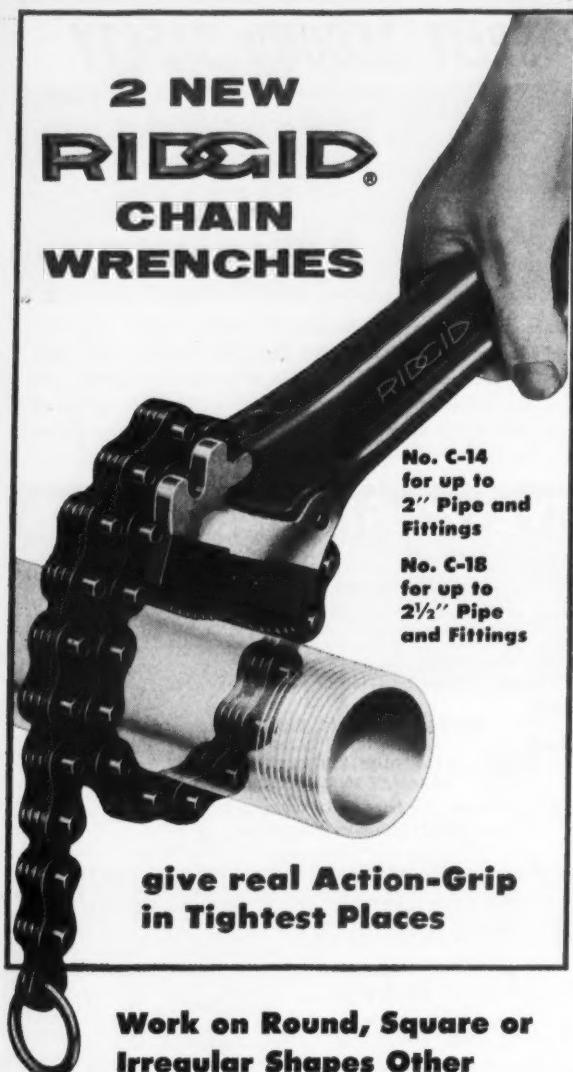
First, the best metal or alloy is selected—hard enough to withstand the abrasive action—ductile enough not to break under stress. Next, the best wire diameter and crimp are determined. Then we weave wire screen or wire cloth around accurate "working openings" best suited for your screening application.

FREE! Write for bulletin 160 giving complete details and facilities.

THE CLEVELAND WIRE CLOTH & MFG. CO.
3577 EAST 78th STREET • CLEVELAND 5, OHIO

Check 2680 opposite last page.

2 NEW RIGID® CHAIN WRENCHES



No. C-14
for up to
2" Pipe and
Fittings

No. C-18
for up to
2½" Pipe and
Fittings

**give real Action-Grip
in Tightest Places**

Work on Round, Square or Irregular Shapes Other Wrenches Can't Reach!

In extra close quarters, there's nothing that'll beat these new **RIGID** Chain Wrenches for getting the job done. Fast, ratchet-like action in either direction . . . from either side. Give tight grip without crushing. Large, easy-to-grab end ring for fast chain adjustment. Tempered steel chain locks securely . . . releases quickly. Rugged, comfort-grip, I-beam handle, guaranteed not to break or warp . . . handy hang-up hole.

Light and easy to use, these new **RIGID** Chain Wrenches do everything a regular wrench can do . . . and much more. Call your Supply House and get one today!

RIGID

Check 2681 opposite last page.

ENGINEERING & SAFETY

Two-part epoxy adhesive cures at room temp

A two-component contact-pressure epoxy adhesive which is now available can be cured at room temperature. Resin is furnished as solvent-free non-volatile medium-thick paste with two-hour pot life.

Adhesive was formulated for uses where it is impractical to apply heavy pressure or heat for hardening. It was primarily intended to join together aluminum, steel, brass, copper, magnesium and combinations of these metals. It may also be used for bonding wood, glass, rubber and plastics (except polyethylene, vinyl and Teflon), as well as reinforced plastics such as laminates of polyester and fibrous glass.

Tests of aluminum-to-aluminum bond with adhesive show tensile shear strength of 3900 psi after 10 minutes at 180°F, 3100 psi after 80 minutes at 150°F, and 2650 psi after two days at room temperature. Tensile strength is 8300 psi, hardness 83 Shore-D.

(Maraset resin 533A is product of Marquette Corp., 37-31 30th St., Long Island City 1, N. Y.)

Check 2682 opposite last page.

Aluminum and epoxy team-up to repair industrial metals

Uses: Repair of metal equipment.

Features: Repair material is non-shrinking.

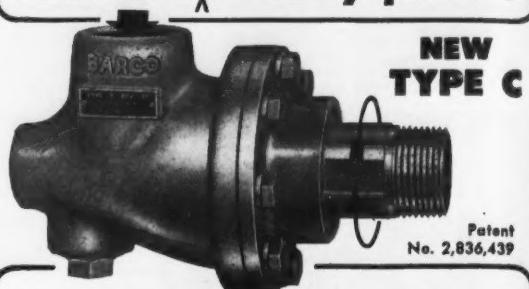
Description: Metal-repair material comes in kit consisting of two three-oz self-measuring tubes. One contains basic 80% aluminum/20%-epoxy resin material. Second is hardening agent.

Equal lengths of material are squeezed from each tube, mixed with wooden paddle and applied to part to be repaired. Material can be machined with metalworking tools, rubbed to metallic luster with steel wool, and/or painted.

(F repair kit is product of Devcon Corporation, Danvers, Massachusetts.)

Check 2683 opposite last page.

Better Need a rotary joint?



- it's BARCO!

For countless applications, Barco's new Type C Rotary Joint will give you the best operating records you've ever had—and for LESS COST!

RESISTS SEAL RING BREAKAGE—The spherical seal ring is under compression, not tension, loading. Self-adjusting for wear. Seal withstands shock loads and alternating hot and cold service.

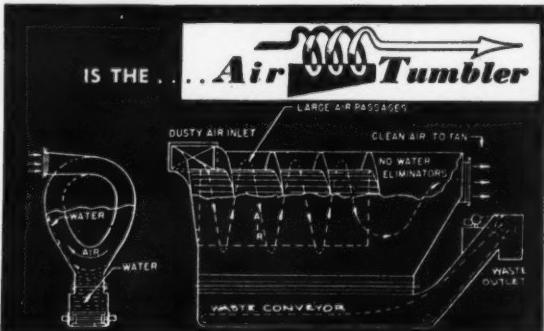
WIDE SPACED BEARINGS—Two, instead of one . . . increased bearing area. No lubrication required. Lowest friction.

MULTI-USE—One basic style for all services, single flow or siphon flow, quick availability from LOCAL STOCKS.

200 P. S. I. STEAM RATING—Heavy duty service at no extra cost. Eight sizes, 1½" to 3". Send for new Catalog 310 today. **BARCO MANUFACTURING CO.**, 537C Hough Street, Barrington, Illinois.

Check 2684 opposite last page.

The MASTER of DUST in INDUSTRY



THE WET COLLECTOR THAT BECOMES STANDARD EQUIPMENT WHEREVER TRIED BECAUSE IT DOES A BETTER JOB AT LESS COST.

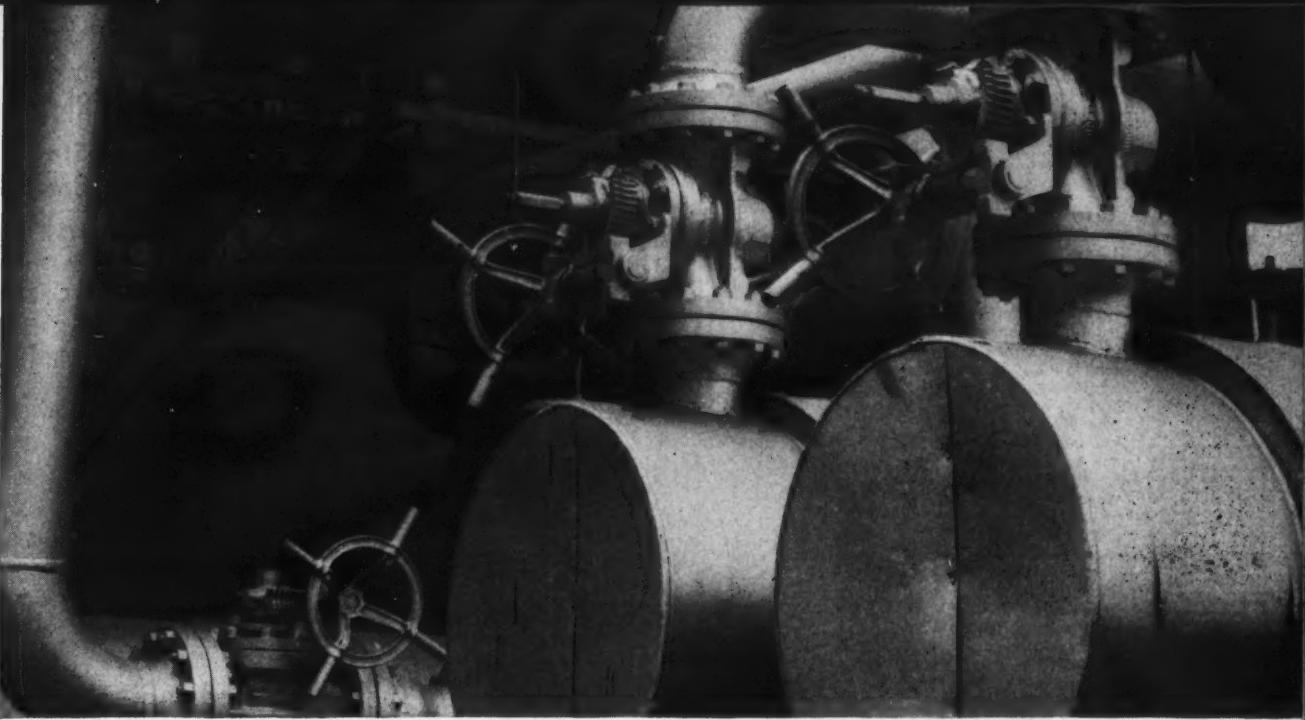
More than one million CFM in ONE plant

Write for Bulletin No. 601 Address

DUST SUPPRESSION & ENGINEERING CO.

P. O. BOX 67 • LAKE ORION, MICHIGAN

Check 2685 opposite last page.



K-51 (Penton) coated Rockwell-Nordstrom valves resist attack by a wide range of corrosive refining fluids.

SPECIAL COATINGS CUT VALVE COSTS

Now, Rockwell-Nordstrom lubricated plug valves are available with special coatings to solve a wide number of corrosion problems that used to require costly special alloy valves.

K-51 (Penton) plastic coatings give iron or steel Rockwell-Nordstrom valves an exceptional corrosion resistance against attack by most acids, caustics and organic-inorganic solvents . . . Kanigen (metallic nickel) coatings assure the corrosion resistance of nickel or stainless steel . . . and Teflon coated plugs assist lubricant efficiency on services where inadequate or infrequent lubrication is anticipated. Whatever your valve needs, for the most difficult services or the easiest ones, the complete line of Rockwell-Nordstrom lubricated plug valves

can fill your needs better and at lower cost. Write for complete details: Rockwell Manufacturing Company, Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited. Rockwell International S.A., Geneva, Switzerland.

Lubrication Makes The Difference

ROCKWELL-Nordstrom VALVES

another fine product by

ROCKWELL



At tank farms, Rockwell-Nordstrom valves with Teflon coated plugs insure longer performance and instant operation at points remotely located from plant.

For more information on product at right, specify 2686 see information request blank opposite last page.



The Right Screen
The Right Open Area
The Right Material

FOR EVERY
SCREENING
REQUIREMENT

H & K PERFORATED SCREENS



.020" Diameter
For grading, sieving, dewatering, filtering, straining—when you want a screen "just right" for the job—you can depend on H & K.

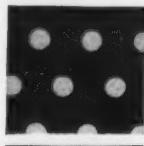


H & K screens are made to your order, with holes accurate and uniform in size, shape and spacing. Burr-free holes are slightly larger at bottom—reduce blinding, save on downtime. Margins and unperforated areas are furnished as specified.



Screens are made in practically any material desired... including plastic. H & K specializes in perforating stainless steel, monel and other corrosion-resistant alloys. Let us work with you on your screening requirements.

Just a few of the many H & K patterns are illustrated



Write for
H & K
General
Catalog

THE
Harrington & King
PERFORATING CO.
INC.

Chicago Office and Warehouse | New York Office and Warehouse
5636 Fillmore St., Chicago 44 | 110 Liberty St., New York, N. Y.

Check 2687 opposite last page.

Accurate Flow Control of Viscous Fluids

New Jacketed
Diaphragm
Control
Valves



...apply heat uniformly throughout the valve from flange to flange and up to the stuffing box.

Valve will operate in response to control air from any standard 3-15% range pneumatic controller. Diaphragm operators for 6-30% ranges are available.

Bodies are semi-steel, Ductile Iron, steel or stainless steel to suit application.

Sizes range from 1 1/4" to 4". Larger sizes on application. For complete details and dimensions write for supplement catalog 356-S.



Parks-Cramer Co.
PROCESS HEATING DEPARTMENT
FITCHBURG 12, MASSACHUSETTS

Check 2688 opposite last page.

Chemical Boobytraps

Unsuspected hazards awaiting the unwary

**Flammable-liquid tanks
not properly vented
can kill firemen**

Fire fighters put their lives in jeopardy every time they attack a fire involving improperly vented flammable-liquid tanks, according to an article published by the National Fire Protection Association.

A total of 41 firemen from both public and private fire departments have been killed in past five years in just five incidents, it was pointed out by Miles E. Woodworth, NFPA flammable-liquids engineer writing in the Association's Quarterly Magazine.

In each case, above-ground tanks storing flammable liquids ruptured or exploded because emergency vents designed to relieve pressure were either too small or improperly designed. The article points out that NFPA flammable-liquids code requirements provide safeguards for hazards encountered in such tank fires.

According to the article, the lessons of these fires "are clear cut and the fire record proves the hazard to fire fighters. Unless more fire fighters are to be needlessly killed, regulatory officials and the owners of flammable-liquid storage tanks must take action now."

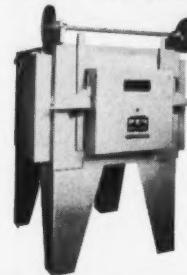
(Reprints of the article, "Inadequate Vents on Flammable Liquid Tanks" are available at 25¢ per copy from the National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass.)

Industrial hose style selection is charted in an easy-to-read booklet. Listed are 112 separate liquids and gases with a guide for proper hose selection for virtually every industrial application. Bul 627—Aeroquip Corporation.

Check 2689 opposite last page.

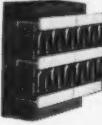
SOLVE HEAT-TREATMENT PROBLEMS for Glass, Steel, Aluminum, Ceramics, Chemical Processing

ONLY TRENT BOX TYPE FURNACES
offer these performance advantages:



- Controlled, Uniform Clean Heat to 2300°F.
- Operate from Standard Voltages
- Standard Switches and Controls
- Require No Transformers
- TRENT "Folded and Formed" Electric Heating Element

THE HEATING ELEMENT MAKES THE DIFFERENCE!



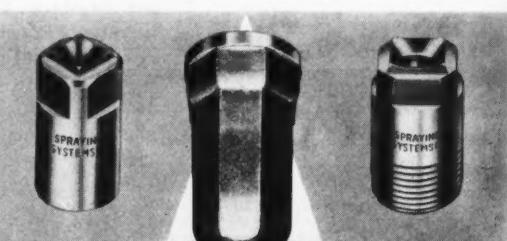
Surface of continuous "Folded and Formed" ribbon type element faces the work chamber—gives up to 4 times the radiating area per given cross section of ordinary types! Let TRENT engineers study your needs to determine the efficient and economical solution to your heating problems.

Write for Bulletin 75-TD



235 Leverington Ave., Philadelphia 27, Pa.
In Canada
Pioneer Electric Eastern Ltd., Toronto

Check 2690 opposite last page.



WIDE ANGLE 93° to 115°

A NEW DESIGN IN FullJet SPRAY NOZZLES

SQUARE SPRAY

For numerous multiple-nozzle applications, because the square spray patterns "fit together", here are nozzles that make possible uniform, complete coverage with fewer nozzles per manifold. This is the latest design in Spraying Systems' very complete line of FullJet nozzles in square and standard-circular spray patterns. For complete information write for Bulletin 105 and Catalog 24.



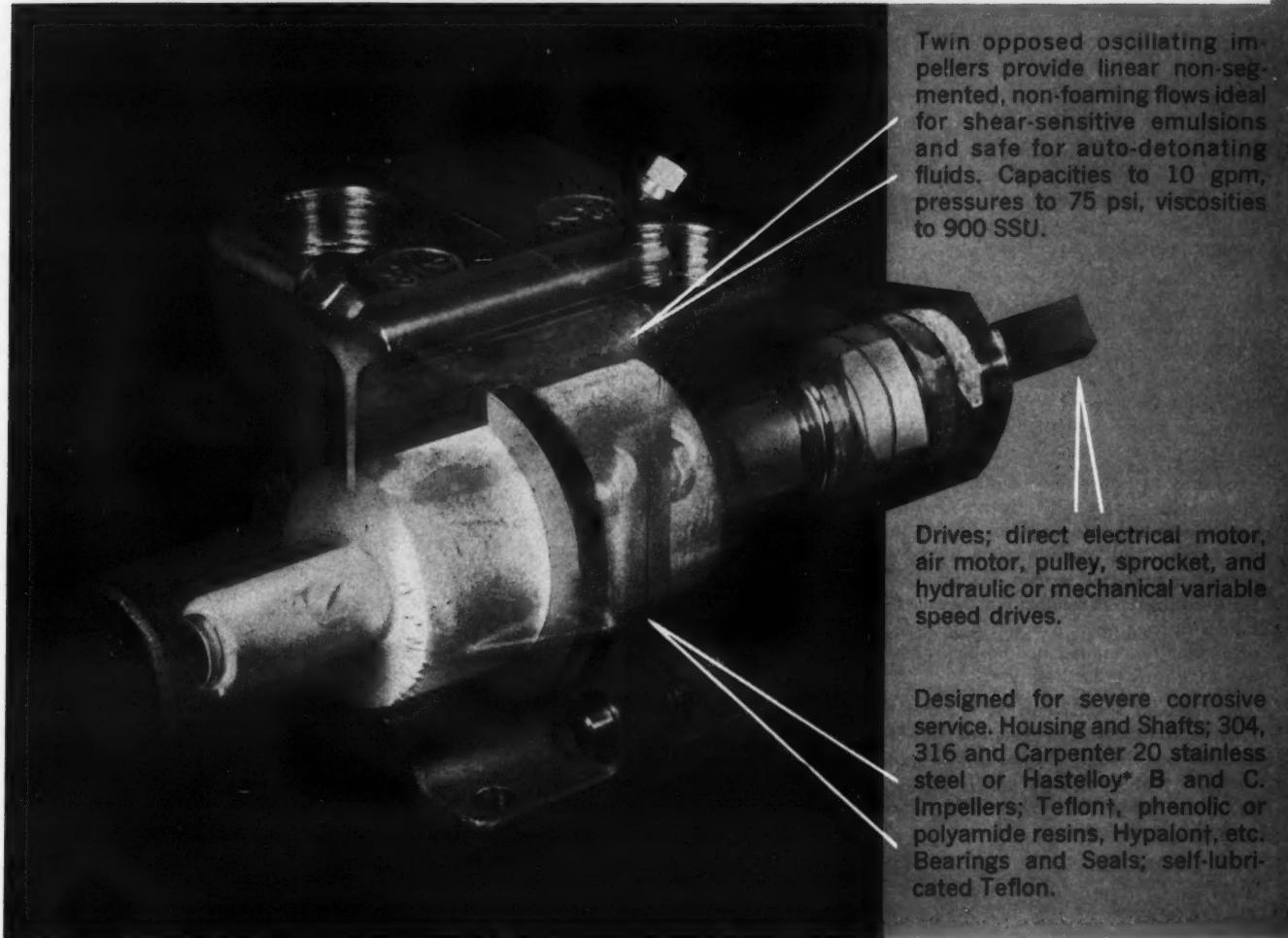
SPRAYING SYSTEMS CO.
3216 Randolph Street • Bellwood, Illinois

AMERICA'S MOST COMPLETE LINE OF SPRAY NOZZLES

Check 2691 opposite last page.

CHEMICAL PROCESSING

LOOK INTO... ECO ALL-CHEM® PUMPS



Twin opposed oscillating impellers provide linear non-segmented, non-foaming flows ideal for shear-sensitive emulsions and safe for auto-detonating fluids. Capacities to 10 gpm, pressures to 75 psi, viscosities to 900 SSU.

Drives; direct electrical motor, air motor, pulley, sprocket, and hydraulic or mechanical variable speed drives.

Designed for severe corrosive service. Housing and Shafts; 304, 316 and Carpenter 20 stainless steel or Hastelloy® B and C. Impellers; Teflon®, phenolic or polyamide resins, Hypalon®, etc. Bearings and Seals; self-lubricated Teflon.



the big-name in small pumps for the process industries

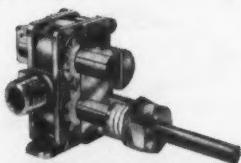
For more information on product at right, specify 2692 see information request blank opposite last page.



CENTRI-CHEM LINE



ALL-CHEM LINE



GEARCHEM LINE



MINILAB LINE

Write for Literature on any or all of the Eco stock pumps shown below for handling corrosive or hazardous processing fluids.
*Union Carbide Trademark. du Pont Trademarks.

ECO ENGINEERING COMPANY • 12 New York Avenue • NEWARK 1, N.J.

SEL-REX RECTIFIER HELPS MAKE THE "LUBES" THAT KEEP MISSILES FROM BEING EATEN ALIVE!

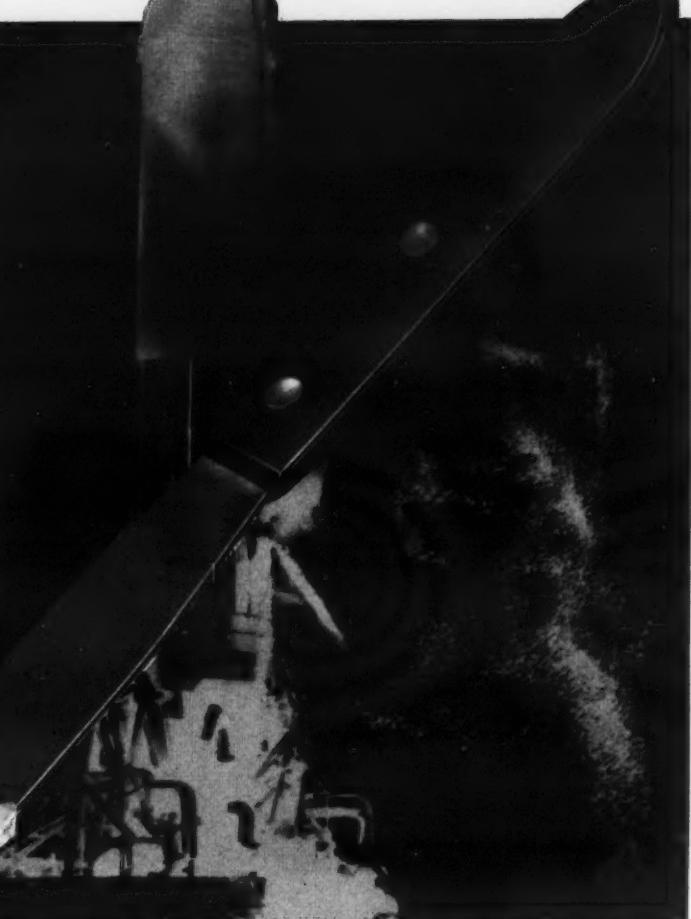
At Hooker Chemical Corporation's Niagara Falls, N.Y. plant, a Sel-Rex rectifier supplies the current for an electrochemical operation important to the U.S. Space Program. It is production of fluorine, basic element of Hooker Fluorolubes®.

Polymers of trifluorovinyl chloride, Fluorolubes are made as non-flammable light oils, heavy bodied oils and greases. Their job is to protect missiles from their own corrosive chemical fuels—the metal-eating, highly-destructive action of pure oxygen, hydrogen peroxide and concentrated nitric acid.

According to Robert F. Schultz, production manager of Hooker's Eastern Chemical Division, the unit supplying current to the fluorine cells must provide uninterrupted, trouble-free service. To date, his Sel-Rex silicon rectifier "has met all expectations; it has proven completely reliable, presenting no maintenance problems and requiring little or no attention."

And for *your* special current needs—for reliable, continuous conversion of A.C. to D.C.—choose Sel-Rex, the industry-proved rectifiers that more than pay for themselves in unequalled dependability and maintenance-free service.

Send for
Free "GUIDE"
to Industrial
Rectifier Equipment



A slippery blanket of Hooker-made Fluorolubes protects missile parts, serves as a lubricant, sealant. A Sel-Rex silicon rectifier supplies the current required to make fluorine, an essential ingredient. "Our Sel-Rex rectifier," states a company official, "has given us the high standard of dependable performance required for our operation."

Complete Semi-Conductor Power Conversion Equipment
and Systems for any AC to DC Application



THE MEAKER COMPANY

SUBSIDIARY OF SEL-REX CORPORATION

Nutley 10, New Jersey

Factories and offices Chicago 50, Ill., Los Angeles, Cal. and Nutley 10, N.J.

Representatives in principal cities.

Check 2693 opposite last page.

ENGINEERING & SAFETY

Cold start + 15-20 minutes = full boiler power

Uses: Small process-steam applications.

Features: Boilers reach full power within 15-20 minutes from cold start. Fuel consumption varies with load requirements, with heat transfer maintaining peak efficiency at all times.

Description: Boiler line includes six models, 16- to 60-bhp range. Standard voltages are available from 110 to 550v. Steam capacities per hour vary in 518- to 2070-lb range. Heat Output ranges from 502,500 to 2,010,000 Btu.

Horizontal steam generators each have central furnaces around which return tubes are arranged concentrically. Light-oil burners utilize pressure-atomizing-type nozzles with fixed capacity. Nozzles deliver raw gas to burner. Timer utilizes straight-gas or combination light-oil and gas units with solenoid valve controlling straight light-oil units.

(CE boilers are product of Cyclotherm Division, Crane Co., Johnstown, Pa.)

Check 2694 opposite last page.

NEW LITERATURE

Plant Engineering, Safety
and Fluids Handling

American-roller-chain hp ratings have been listed in 12-page proposal for adoption to the American Standards Association. Ratings represent results of extensive research in which studies were made of roller-impact forces, dynamic-tension forces, efficiency and wear life. Copies of "New Horsepower Ratings for American Standard Roller Chains"—may be obtained at \$1.00 each from Association of Roller and Silent Chain Manufacturers, 3343 Central Ave., Indianapolis 5, Ind.

Electrode glands for pressure sealing electrical leads are subject of eight-page catalog. Units described include ceramic insulated and all-teflon insulated glands which operate in systems having pressures from 0.005 microns absolute to 2500 psi. Catalog 960 — Conax Corporation.

Check 2695 opposite last page.

Power - distribution systems are topic of 48-page bulletin outlining principles of planning such set-ups for safety, reliability and economy. Chapters are included on choosing voltages, short-circuit calculations, protective relaying, selection of unit substations, power-factor corrections and grounding. Bul GEA-7139 — General Electric Company.

Check 2696 opposite last page.

Over 800 semiconductor devices are reviewed in 24-page catalog including ratings, characteristics and descriptive data. Copies of Short Form Cat may be obtained by letterhead request to International Rectifier Corporation, El Segundo, Calif.

Flexible-cushion couplings are considered in 20-page bulletin which specifies two types: one for high-speed torque applications and other for attachment to flywheels of internal combustion engines. Bul 901—Dodge Manufacturing Corporation.

Check 2697 opposite last page.

Tank heaters of vertically mounted, horizontally mounted, and immersion types are topic of eight-page bulletin giving applications, dimensions, heating surface and other specification data on each unit. Bul 300—Brown Fintube Company.

Check 2698 opposite last page.

Static-transducer characteristics, functions and typical applications are discussed in detail in 38-page manual which is illustrated with charts, diagrams, cutaway drawings and photographs. Transducer Manual T-11—Control, Division of Magnetics, Inc.

Check 2699 opposite last page.

Hydraulic rotary actuators for commercial use are described in detail in 16-page catalog. Torque range of units covered is from 1500 to 702,000 inch pounds at 3000 psi. Hyd Ro Ac catalog—Houdaille Industries, Inc.

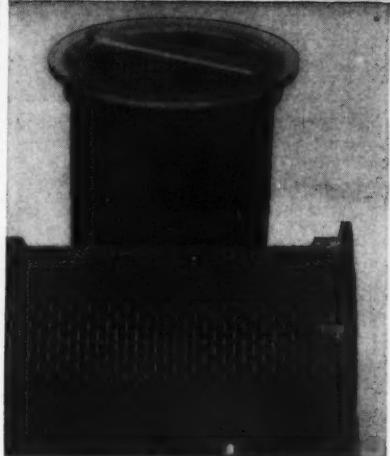
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NEXT MONTH

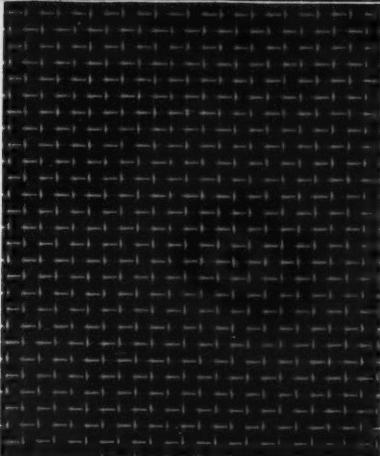
Maintenance suggestions to increase the lives of your belt, bucket and flight conveyors are the subject of an article appearing in this section next month. The authors also make a plea for upgrading the job of the "grease monkey"—an expensive luxury they say industry can no longer afford.

Need Wire Cloth in Special Metals?

call Cambridge



HASTELLOY C*



SILVER



TITANIUM

Working with unusual metals or alloys—as well as with standard metals and alloys—is almost an everyday occurrence at Cambridge. For instance, not too long ago, we developed the first practical method of weaving titanium into wire cloth—with mesh counts far higher than had been expected by the customer. Platinum, lead, stainless steel, or bronze—whatever the metal or alloy used, Cambridge has the experience and facilities to produce wire cloth in any size or quantities to the closest tolerances.

If you require fabrications—of any shape or size—Cambridge has the craftsmen and know-how to fill even the most rigid specifications. Or, we'll draw up prints for your approval. There's a wire cloth expert near you—ready to discuss your needs and show you how to get what you want economically and on time. He's your Cambridge Field Engineer...and his name is listed in the Yellow Pages under "Wire Cloth." Or, write for our illustrated, 120-page catalog.



Refer to our technical data sheets in CHEMICAL ENGINEERING CATALOG, Page 185.



The Cambridge Wire Cloth Co.

DEPARTMENT F • CAMBRIDGE 2, MARYLAND

Manufacturers of Wire Cloth, Wire Cloth Fabrications, Metal-Mesh
Conveyor Belts and Gripper® Metal-Mesh Slings.

Check 2701 opposite last page.

Equipment for dust surveys, air pollution analysis, radiation protection and sub-micron filtration is detailed in 44-page publication. "Dust Topics Vol 1 No. 2"—The Gelman Instrument Company.

Check 2703 opposite last page.

Centrifugal-pump users can now obtain a 12-page selection catalog. Included in this condensed, easy-to-use circular are charts showing recommended temperature and pressure ranges for 10 classifications of centrifugal units. Copies of circular No. 184 may be obtained on letterhead request to Dean Brothers Pumps, Inc., 323 W. 10th St., Indianapolis 7, Indiana.

Condensate scavenging systems, and the use of external regenerating ion-exchange units in connection with them, are discussed in 12-page article reprint. Several case histories are reviewed and cost comparisons made. Technical reprint T-182—Graver Water Conditioning Company, Division of Union Tank Car Company.

Check 2704 opposite last page.

Photocopying machines and photocopy papers are described in 16-page, two-color brochure. A section is also allotted to photocopy chemicals, and lists types of photocopies that are legally prohibited by Congress. Bul 222 — Haloid Xerox Inc.

Check 2705 opposite last page.

Tubular laminated Fiberglas reference handbook contains details on design characteristics, a design check list, charts of comparative tensile strength and other helpful data to permit evaluation of this product for many applications. "Tubular Laminated Fiberglas"—Pacific Laminates, Subs Ekco Products Company.

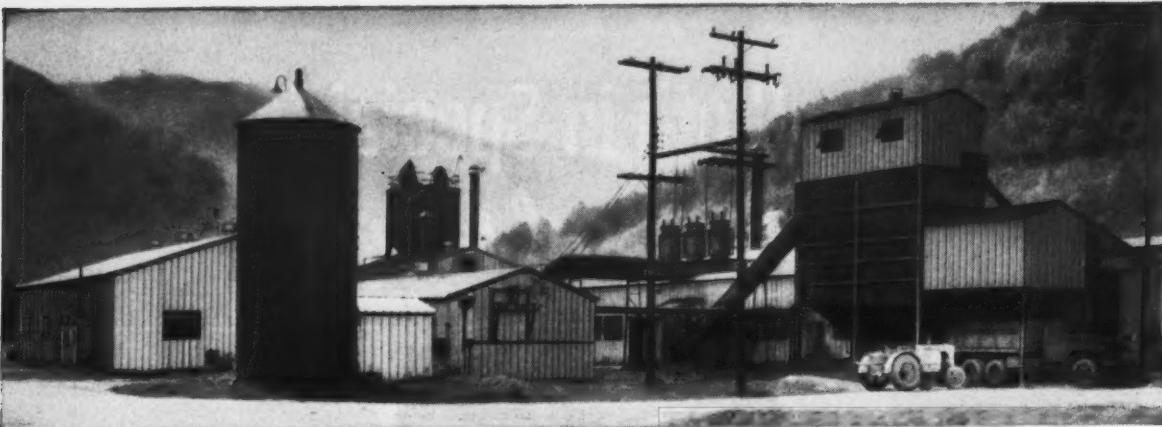
Check 2706 opposite last page.

Oxygen, both liquid and gaseous, is subject of 14-page brochure which describes purity, containers and delivery, handling, typical uses and includes an engineering data table. Form 5881 — General Dynamics/Liquid Carbonic Division.

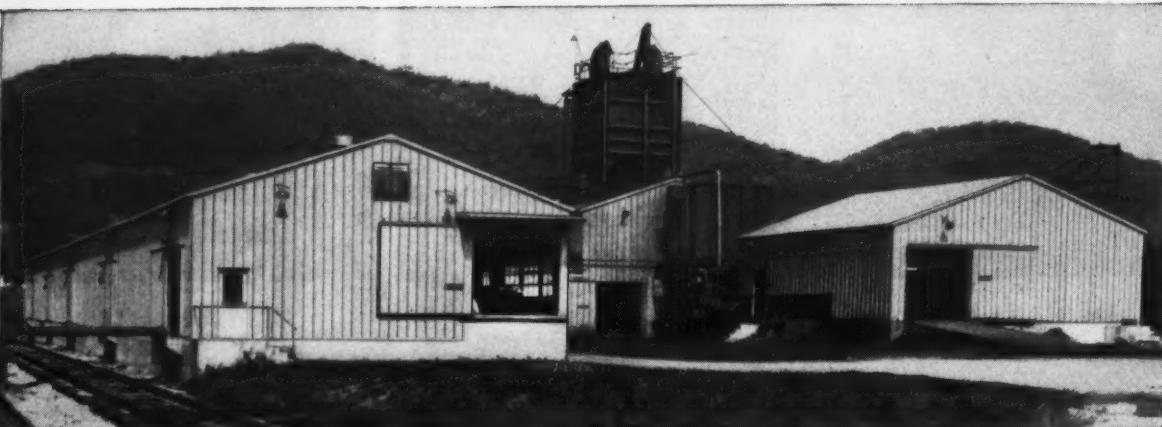
Check 2707 opposite last page.

Weight computations for welded steel tubing are easily obtained from tables in 16-page brochure which gives dimensions and weight per foot for round mechanical tubing up to 10 inches; square and rectangular tubing to 5 inches; and pressure tubing up to 5 inches. "Weight Tables for Welded Steel Tubing"—Jones & Laughlin Steel Corporation.

Check 2708 opposite last page.



Butler buildings at Charcoal City • Storage Building • Transfer Shed • Power House • Tractor Garage (2) • Processing and Packaging • Pump House • Unloading • Equipment Repair • Office • Elec. Sub-Station • Head Houses (2) • Conveyor Shelter



"CHARCOAL CITY"...

a village of Butler Buildings

The folks around Parsons, West Virginia, have come to think of the Kingsford Chemical Company's plant as Charcoal City. Here, nestled in the hills of West Virginia, is a large, completely self-contained manufacturing facility for producing charcoal briquettes.

And every structure in Charcoal City, from the office to the pump house—including processing and warehousing facilities—is a pre-engineered Butler building.

Why Butler? The answer is simple. First of all, with Butler you're not limited to a few standard size buildings. You can choose from a wide selection of pre-engineered components and build as large or as small as you wish. Then, there's Butler quality. Precision fabricated

Butler components fit together perfectly. Your completed building is neat, structurally sound, and completely weathertight. Interiors are spacious, free of columns and overhead trusses. Your Butler building gives you more usable space for your construction dollar. And, of course, there are the inherent advantages of all-metal construction: standardization, fire safety, favorable insurance rates, low maintenance costs, and fast, economical expansion.

If you're planning to expand existing facilities, or build a completely new plant, get the full story on Butler buildings today. Call your nearby Butler Builder. Ask about Butler financing, too. He's listed in the Yellow Pages under "Buildings" or "Steel Buildings." Or write direct.

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Manufacturers of Metal Buildings • Plastic Panels • Equipment for Farming, Transportation, Bulk Storage, Outdoor Advertising • Contract Manufacturing. Sales offices in Los Angeles and Richmond, Calif. • Houston, Tex. • Birmingham, Ala. • Kansas City, Mo. • Minneapolis, Minn. Chicago, Ill. • Detroit, Mich. • Cleveland, Ohio • New York City and Syracuse, N.Y. • Washington, D.C. • Burlington, Ontario, Canada

Check 2702 opposite last page.





manufacturers' current literature

This section features a variety of literature currently available from manufacturers. See also the other sections in this issue for new literature pertaining to those particular sections

Chemical Materials

Phosphoric anhydride (pentoxide) assays typically 98% minimum. Specifications are covered on Data Sheet 802—Hooker Chemical Corporation.

Check 2709 opposite last page.

Methanol is marketed at minimum purity of 99.85%. Further details are included in Methanol Bul—Industrial Chemicals Department, Commercial Solvents Corporation.

Check 2710 opposite last page.

1, 3-Butylene glycol is four-carbon glycol combining two non-adjacent hydroxyl groups. Its properties and suggested uses are included in bulletin available from Celanese Chemical Company, Division of Celanese Corporation of America. Check 2711 opposite last page.

Methanol is covered in 32-page booklet including 36 tables, graphs and charts. Information section includes specifications, chemical and physical properties, uses, toxicology, shipping, handling, storage and specification test methods. CSC Methanol Guidebook — Industrial Chemicals Department, Commercial Solvents Corporation. Check 2712 opposite last page.

Silicone-anti-foaming agents are specified in eight-page "ABC's of Defoaming"—Dow Corning Corporation.

Check 2713 opposite last page.

Custom-made chemicals are discussed in bulletin put-out by General Chemical Division, Allied Chemical Corporation.

Check 2714 opposite last page.

Peroxygen chemicals are gone into in bulletin available from Becco Chemical Division, Food Machinery & Chemical Corporation.

Check 2715 opposite last page.

Alkyl-boric-acids properties and suggested uses are reviewed in Bul C-710—Calloway Chemical Company.

Check 2716 opposite last page.

Metal treatment and etching developments are subjects of several bulletins. Considered are surface treatment of metals with peroxygen compounds (39 and 51), improving properties of copper and brass surfaces (86), paddle etching of printed circuits with ammonium persulfate (97), tank-immersion etching of printed circuits with ammonium persulfate (99), and etching of printed circuits with mercury activated persulfate (102). Buls 39, 51, 86, 97, 99 and 102—Becco Chemical Division, Food Machinery & Chemical Corporation.

Check 2717 opposite last page.

Oxalic-acid properties and uses are delineated in Data Sheet 789—Hooker Chemical Corporation.

Check 2718 opposite last page.

Processing Equipment

Ball mills, such as 10 x 32' two-compartment model built for Standard Lime and Cement Company, are considered in Ball Mill Bul—Traylor Engineering & Manufacturing, Division of Fuller Company, Subsidiary of General American Transportation Corporation.

Check 2719 opposite last page.

Centrifuge utilizes combination of centrifugal separating force, screen filtering action, and screw-conveyor or solids—metering action—applied simultaneously to slurry. It is specified in Super Conejector Bul—The Sharples Corporation.

Check 2720 opposite last page.

Heat-transfer equipment, including evaporators, vacuum-rotary and drum dryers, heat exchangers, and flakers, is subject of Heat-transfer Equipment Bul—Goslin-Birmingham Manufacturing Co., Inc.

Check 2721 opposite last page.

Pulp and storage tanks, for 500- to 2000-gal and 100- to 5000-gal capacities, respectively, are subject of Pulp and Storage Tanks Buls—Lee Metal Products Company, Inc.

Check 2722 opposite last page.

GOODALL

For Reliable Protection

IN PLANT AND LABORATORY



COATS • APRONS • OVERALLS

Rubber and Oil-Resistant Neoprene, in full range of styles and sizes. Carefully tailored to provide fine appearance, maximum comfort and long wear. Acid and Oil-Resistant Suits . . . safe, durable, comfortable.



"GOODSEAL" All-Purpose GLOVES

Special compound impervious to actions of oil, acids, alkalies, animal fats and most other solids and solutions. Smooth, flexible, easy to wear. Highly resistant to snagging and puncturing. Extra-grip finish on finger tips.

BOOTS • SHOES • RUBBERS

Rubber Boots and Lace Work Shoes, with or without "Toe-Saver"® Safety Toe. Slip-resistant soles. Molded Neoprene Work Rubbers and 10" Over-the-Shoe Boots.



"If it's GOODALL, it MUST be Good!"

Contact Our Nearest Branch for Details and Prices
See Pages 338-339, Chemical Engineering Catalog

Standard of Quality—Since 1870



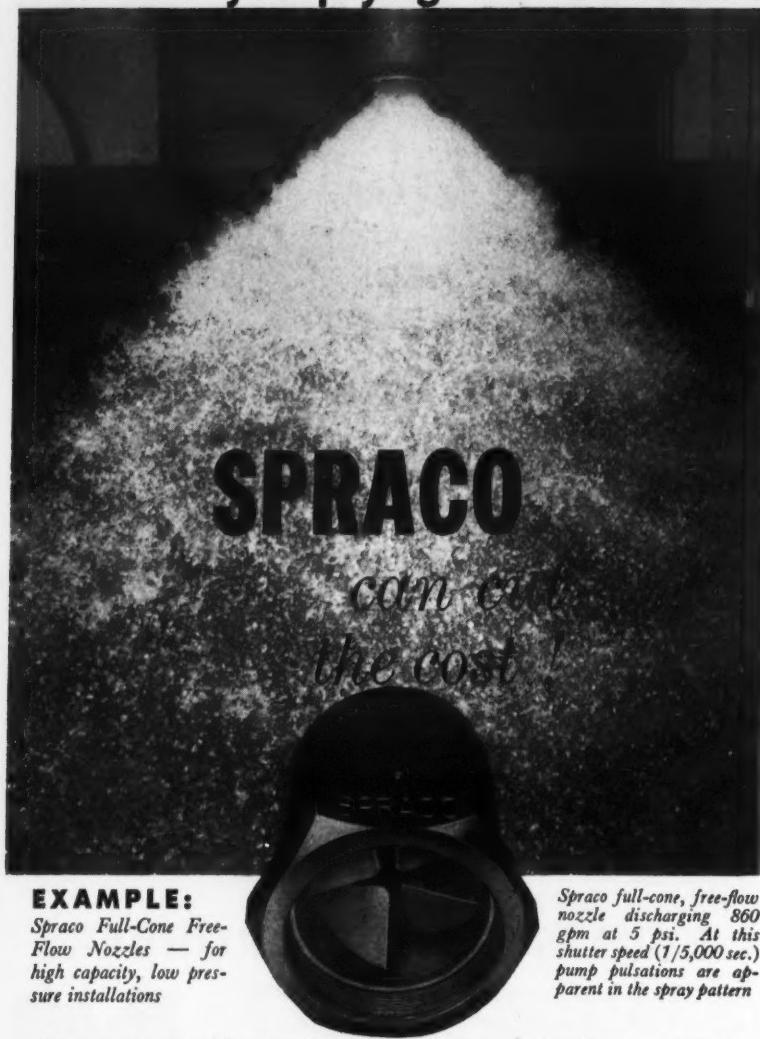
HOSE • BELTING • FOOTWEAR • CLOTHING
AND OTHER INDUSTRIAL RUBBER PRODUCTS

GOODALL Rubber Company

GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N. J.
BRANCHES AND DISTRIBUTORS THROUGHOUT THE UNITED STATES.
IN CANADA: GOODALL RUBBER CO. OF CANADA LTD., TORONTO.

Check 2723 opposite last page.

What are you paying for SPRAYING?



EXAMPLE:

Spraco Full-Cone Free-Flow Nozzles — for high capacity, low pressure installations

To answer a long felt processing need, Spraco recently developed a totally new line of full-cone, free-flow nozzles for high capacity, low pressure installations where clogging is a problem and a full-cone spray a necessity. Featuring streamlined internal vane construction with maximum vane openings, they offer minimal flow resistance, virtually eliminate clogging.

Now widely used in cooling towers, coke quenching, aerating and purifying water supplies, and a host of chemical processing applications, Spraco Full-Cone Free-Flow nozzles are another excellent example of how Spraco cuts the cost of spraying by increasing the efficiency of the system.

What's your spray nozzle problem? Spraco offers the most complete range of nozzle sizes and capacities available anywhere, always in stock, and made from bronze, cast iron, stainless steel, or, to order, from any special machineable material.

Write today for the most comprehensive spray nozzle catalog ever published. Complete, accurate performance data for each of the hundreds of spray nozzles in the line.

SPRAY ENGINEERING COMPANY, 105 Cambridge Street,
Burlington, Mass.

SPRACO

Check 2724 opposite last page.



CURRENT LITERATURE

Kettles are subject of six bulletins. Styles considered are 2/3-jacketed, 80- to 300-gal (CW); 2/3-jacketed, 5- to 500-gal (A); 2/3-jacketed, 5- to 100-gal (C); center-line, scraper-agitator, 80- to 300-gal (CW3T); full-jacketed, 10- to 300-gal (B); and 2/3-jacketed, 40- to 200-gal (pressure) models. CW, A, C, CW3T, B, and Pressure Kettle Buls — Lee Metal Products Company, Inc.

Check 2725 opposite last page.

Processing equipment, including pressure vessels, fractionating towers, stills and tanks, condensers and similar equipment, is tabulated in bulletin available from Sun Shipbuilding & Dry Dock Company.

Check 2726 opposite last page.

Steel-belt coolers handle materials with temperatures to 1900°F in capacities to 25 tph. They are tabulated in Water-Bed Coolers Bul — Steel Belt Conveyor Department, Sandvik Steel, Inc.

Check 2727 opposite last page.

Tower Internals, including support plates, distributors and hold-down plates are taken-up in 32-page Tower Internals Manual — Process Equipment Division, U. S. Stoneware.

Check 2728 opposite last page.

Lime-plant equipment including stone preheaters, short rotary kilns, centralized kiln controls and contact coolers, are topic of Lime-plant Equipment Bul — Kennedy Van Saun Manufacturing & Engineering Corporation.

Check 2729 opposite last page.

Bowl mill for firing kilns is presented in Cat 75P — Raymond Division, Combustion Engineering, Inc.

Check 2730 opposite last page.

Screening machine for separation of wet or dry materials is considered in Rotex Bul — The Orville Simpson Co.

Check 2731 opposite last page.

Jet-Venturi processing equipment is reviewed in bulletin available from Croll-Reynolds Co., Inc.

Check 2732 opposite last page.

Heat exchanger incorporating moving blades is treated in Thermulator Bul — Cherry-Burrell Corp.

Check 2733 opposite last page.

Vacuum pans in 10- to 500-gal capacities and quick-cooling pans in 50- to 200-gal capacities are subject of two bulletins put-out by Lee Metal Products Co., Inc.

Check 2734 opposite last page.

Continuous mixers, which can be powered with motors in 1- to 10-hp range are specified in Bul RL-200 — Gabb Special Products Inc.

Check 2735 opposite last page.

Mixers are expanded upon in a bulletin published by Sprout, Waldron & Co., Inc.

Check 2736 opposite last page.

Scrubber incorporates centrifugal forces and water action in combination with high-velocity fan in second stage of operation to eliminate dust particles from gas stream. It is explained in Bul 7460 — The Ducon Company Inc.

Check 2737 opposite last page.

Corrosion Control

Flexible pipe connectors made of material fabricated from Teflon are serviceable in temperature range of -65 to +350°F. They are treated in Chemlon Pipe Connectors Bul — Crane Packing Co.

Check 2738 opposite last page.

Teflon sheet, rod, tube, tape, hose and machined parts are among items covered in Teflon Products Cat — Plastic Products Division, Raybestos-Manhattan, Inc.

Check 2739 opposite last page.

Progressing-cavity pumps are designed with only one moving part. They are available in nine sizes in capacities of 1/100 to 500 gpm for pressures to 1000 psi. Further details can be found in Bul 100-CP — Robbins & Myers, Inc.

Check 2740 opposite last page.

Aluminum-bronze alloy, which is handling 35% solution of hot-sulfuric-acid sludge as construction material for a truck tank, is covered in bulletin available from Ampco Metal, Inc.

Check 2741 opposite last page.

NEXT MONTH

Many of the perplexing problems inherent to the production of glassine and greaseproof paper are resolved by a three-phase stock preparation system recently completed by Nicolet Paper Corp., West De Pere, Wisc. For details on the system, which sums up Nicolet's 33 years of experience, see the Idea section next month.

THAT'S
INTERESTING

New twist
on cans

Can openers could become obsolete with development of quick-open top. Can, developed jointly by Aluminum Company of America and United Shoe Machinery Corp., consists of foil board lamination for the body, with an overlap seam, and aluminum ends.

By merely lifting a loop and pulling, the tab on the top tears out a thin, scored strip of aluminum around circumference of the top.

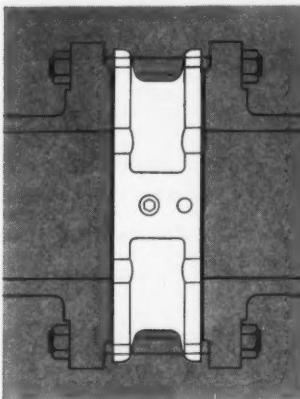
Next step is development of equipment to mass-produce cans at low price.

Atom waste
salted away

An unused portion of a salt mine near Hutchinson, Kas., is being used to test the feasibility of storing highly radioactive wastes in salt cavities.

Salt formations are believed to be impermeable, have good tensile strength, and good thermal conductivity.

The Duo-Chek® is easily lowered into position between the flange faces; because of its light weight, special handling equipment is unnecessary. Fits standard valve flanges. In sizes 2 inch through 12 inch, one valve fits series 125, series 150 and series 300 flanges, saving inventory at less cost than a conventional 150 series. The machined outside diameter centers the Duo-Chek between series 300 flanges; the slots center it for series 150 flanges.



See the Duo-Chek
Booth 222
1961 Petrochemical & Refining Show
New Orleans

MISSION DUO-CHEK NO SLAM

CHECK VALVE

PAT. PENDING

If your check valve problem is water hammer, Duo-Chek is the answer. If it's weight, maintenance, mounting position, or cost, Duo-Chek is still the right answer. The Duo-Chek

performs all regular check valve duties, yet weighs only ten per cent as much.

The spring loaded, light weight sealing plates operate in any position—even in vertical lines with downward flow. The stainless steel coil spring effects positive sealing action. The quick action of the spring closes the valve before reverse flow can occur; therefore, no slam, no water hammer.

Duo-Chek valves come in a complete range of end connections and sizes from 2 to 48 inches, for ASA pressure ratings of series 125 through 2500, and for temperatures to 1400°F. They are made in steel, stainless steel, aluminum, and bronze. Sealing materials are Buna-N, Teflon, Viton, or metal depending on your service.

MISSION VALVE AND PUMP CO. A SUBSIDIARY OF MISSION MANUFACTURING CO. P.O. Box 4209, Houston, Texas • Cable Address "MISSCO"
Export Office: 30 Rockefeller Plaza, New York • In the United Kingdom: MISSION MANUFACTURING CO., LTD., 1 Hanover Square,
London W. 1 England • Cable Address "MISSOMAN" • Sold by Mission Manufacturing Company outside of Canada and the U.S.A.



Check 2742 opposite last page.

**Now tackle BIG jobs
or SMALL...**



**SWENCH®
Manual Impact Wrenches
NOW AVAILABLE IN NEW
½" & ⅝" UTILITY SIZES**

Small in size, the all new $\frac{1}{2}$ " and $\frac{5}{8}$ " SWENCH manual impact wrenches are big in power when it comes to loosening tough, small sized "frozen" nuts and bolts.

Like the heavy duty SWENCH wrenches for industrial use, the new $\frac{1}{2}$ " and $\frac{5}{8}$ " sizes apply a tremendous wallop of torsional impact in automotive, light industrial, commercial, and utility use. Now a completely portable SWENCH can be taken to any job—big or small—for high speed, safe and easy removal of "frozen" nuts and bolts that previously had to be burned off or drilled out. SWENCH wrenches are economical too—they cost far less than other types of impact wrenches and save valuable man hours.

In addition to the new $\frac{1}{2}$ " and $\frac{5}{8}$ " sizes, SWENCH wrenches are available with $\frac{3}{4}$ ", 1", $1\frac{1}{4}$ " and $1\frac{1}{2}$ " drives. Call your local industrial distributor today for a demonstration or write to:

Don't wrench it -SWENCH IT!

CURTISS WRIGHT
MARQUETTE DIVISION

1145 Galewood Drive, Cleveland 10, Ohio

Check 2743 opposite last page.

CURRENT LITERATURE

Needle valves made of Type-316 stainless steel can handle pressures from a few to 6000 psi. Available in sizes of $\frac{1}{8}$ to 1" in globe, angle and panel-mounted patterns, valves are considered in Bul NV-3—Marsh Instrument Company, Division of Colorado Oil and Gas Corporation.

Check 2744 opposite last page.

Gages of reflex or transparent type are lined with natural and synthetic rubbers, lead, phenolic-base compounds, Teflon, and other materials. Complete grouping is depicted in Lined Gages Bul—Jer-guson Gage & Valve Company.

Check 2745 opposite last page.

Packless plug valves are available in corrosion-resistant construction of aluminum, stainless steel, lined cast iron and other materials in sizes of $\frac{3}{8}$ to 10". They are presented in catalog available from Dia-Plug, Division of Cryogenics Corporation.

Check 2746 opposite last page.

**Process Instrumentation
and
Laboratory Apparatus**

Accurate feeding to process mainstream is considered from viewpoint of new control applications in "Engineering Briefs"—Milton Roy Company.

Check 2747 opposite last page.

Valves are subject of three bulletins covering pressure-regulating (401), standard-diaphragm-operated control valves (CV53) and split-body (132) types. Buls 401, CV53 and 132—Kieley & Mueller, Incorporated.

Check 2748 opposite last page.

Three groups of dial gages—for extreme, tough and general services—are presented in Gage Cat—Marsh Instrument Company, Division of Colorado Oil & Gas Corporation.

Check 2749 opposite last page.

Pyrex tubular gage glass and cylinders are supplied in any length or finish in 2-mm. to 7"-OD range. They are indexed in bulletin available from Swift Glass Division, Swift Lubricator Company, Inc. Check 2750 opposite last page.

Pressure element has sensing head less than one inch in diam. Its role in high-pressure measurement in extrusion of synthetic fibers, plastics and films is delved into in Bul 98398—Taylor Instrument Companies.

Check 2751 opposite last page.

Remote-control flowmeter is subject of Bul FL-56—Hetherington & Berner Inc., Subsidiary of American Hoist & Derrick Company. Check 2752 opposite last page.

Tape-programmed gas chromatograph incorporates motor-driven transparent film in conjunction with photo-electric transmitter and receiver to provide any combination of time and sequence required. It is explained in Gas Chromatograph Bul—Instrument Division, Mine Safety Appliances Company.

Check 2753 opposite last page.

Automatic metering pumps are considered in Cat 59—Process Equipment Division, Lapp Insulator Co., Inc.

Check 2754 opposite last page.

Temperature-control systems are taken up in a bulletin available from Thermo Electric Co., Inc.

Check 2755 opposite last page.

Precision instrument parts and associated components available from stock are listed in Cat 22—PIC Design Corp., Subsidiary of Benrus Watch Company, Inc.

Check 2756 opposite last page.

Automatic bin-level indicator incorporates stainless-steel diaphragm. It is subject of Bul AB-19—The Bin-Dicator Co.

Check 2757 opposite last page.



SAVE

with

ROCKWELL RESILIENT SEATED BUTTERFLY VALVES



SAVE SPACE

Valve face-to-face is a fraction of the face-to-face of a gate valve. We call it a "wafer" valve.

SAVE WEIGHT

From 60 to 80 percent, depending on size.

SAVE COST

In initial outlay and in overall maintenance.

SAVE TROUBLE

Valve disc shuts off leak-tight against resilient seat from maximum line pressure to high vacuum. The disc cannot jam. Valve is self-cleaning. "Kee-lok" snap-in type liner is renewable. Control may be manual or automatic.

Write for Bulletin 590

W. S. ROCKWELL COMPANY

2200 Eliot St. • Fairfield, Conn.

Made and sold in Europe by
LOCKBURNS, LTD., Glasgow S.W.2, Scotland.

Check 2758 opposite last page.

CURRENT LITERATURE

High-pressure gages of various types are subject of catalog available from Strahman Valves Incorporated.

Check 2759 opposite last page.

Fluids Handling

Gear-pump line has models for flow rates to 10 gpm at pressures to 100 psi. They are taken up in Gearpump Bul.—Eco Engineering Company.

Check 2760 opposite last page.

Canned pumps, each have oil-filled stator cavity and automatic thrust balance. Additional specifications are incorporated in Bul 2050—Chempump Division, Fostoria Corporation.

Check 2761 opposite last page.

Tube fittings, for instrument-air (4324), high-pressure (4320), corrosive (4322A), permanent-joint (4370) and brazed-joint (4375) applications, are specified in Cats 4324, 4320, 4322A, 4370 and 4375 — Parker Fittings and Hose Division, Parker Hannifin Corporation.

Check 2762 opposite last page.

Rotary joint has spherical seal ring under compression loading. Self-adjusting unit is detailed in Cat 310—Barco Manufacturing Company.

Check 2763 opposite last page.

Pump cups of both conventional and 45°-bevel types are reviewed in Bul 5903—Darling Valve & Manufacturing Co.

Check 2764 opposite last page.

Pumps, incorporating twin opposed oscillating impellers, provide linear non-segmented non-foaming flows for shear-sensitive emulsions. They are available in capacities to 10 gpm for pressures to 75 psi and viscosities to 900 SSU. Pumps are subject of All-Chem Pumps Bul.—Eco Engineering Company.

Check 2765 opposite last page.

Shop-fabricated pipe of power and process type is subject of bulletins available from Pipe Fabrication Institute.

Check 2766 opposite last page.

Gear pumps direct-connected to 1800 rpm require no reduction gears. Horizontal or vertical models handle 32- to 5-million SSU and 1- to 650 gpm at pressures to 350 psi. They are specified in Bul G-3 — Sier-Bath Gear & Pump Co., Inc.

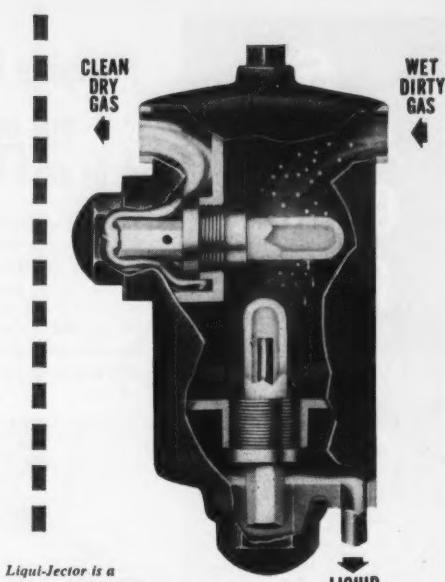
Check 2767 opposite last page.

SELAS liquid-gas separation

for completely effective removal of entrained liquids and solids from air, gas and steam systems

Selas Liqui-Jectors utilize basic principles of capillary physics and surface chemistry . . . protect air, gas and steam systems and pneumatically-operated instruments and mechanisms from effects of entrained water, oil, water-oil emulsions and dirt.

Easily installed, no moving parts, minimum maintenance. Standard models available for capacities up to 7000 scfm at pressures up to 200 psig. Units custom-built for larger volumes, higher pressures and special conditions. Send for new Bulletin 102.



Liqui-Jector is a registered trademark of Selas Corporation of America

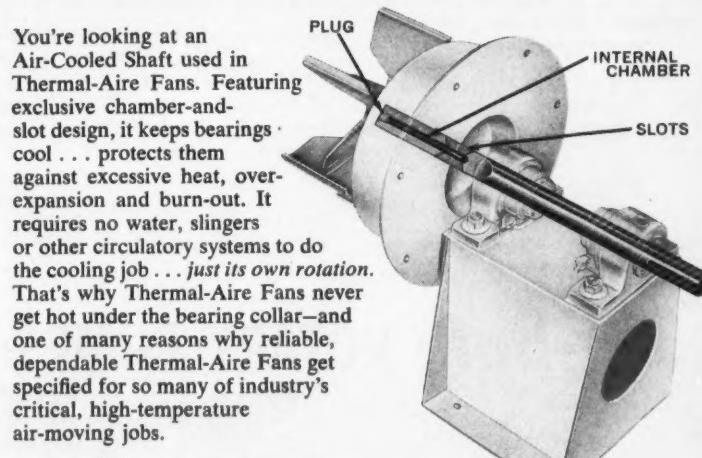
SELAS
Flotronics

Spring House, Pa.
A Division of Selas Corporation of America

Check 2768 opposite last page.

Here's Why Thermal-Aire Fans NEVER GET HOT UNDER THE COLLAR!

You're looking at an Air-Cooled Shaft used in Thermal-Aire Fans. Featuring exclusive chamber-and-slot design, it keeps bearings cool . . . protects them against excessive heat, over-expansion and burn-out. It requires no water, slingers or other circulatory systems to do the cooling job . . . just its own rotation. That's why Thermal-Aire Fans never get hot under the bearing collar—and one of many reasons why reliable, dependable Thermal-Aire Fans get specified for so many of industry's critical, high-temperature air-moving jobs.



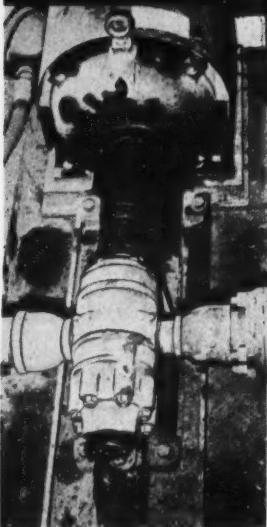
■ Write today for Bulletin 960

THERMAL-AIRE FANS

Garden City Fan & Blower Co., 803 N. Eighth St., Niles, Mich.

Check 2769 opposite last page.

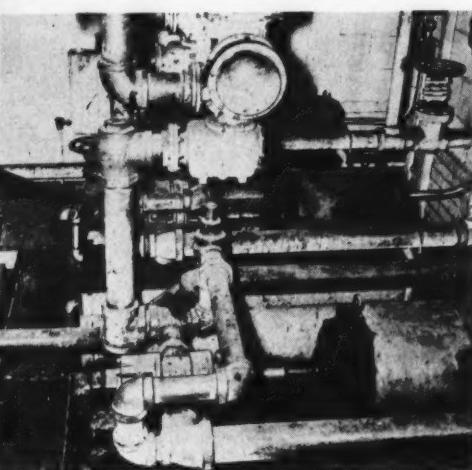
5
Sier-Bath
GEAREX®
PUMPS



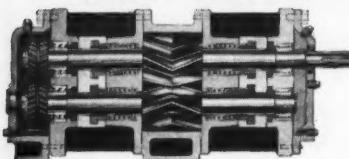
**Pumping Hot Varnish 10 Years
-- not one cent for repairs!**

At DE SOTO CHEMICAL COATINGS CORP.

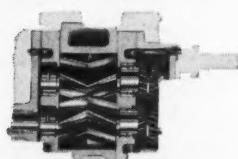
The only maintenance in 10 years has been several tightenings of the original packing, still in use without leakage. The Gearex Pumps are transferring 35 gpm. of hot varnish from tank trucks to storage tanks 5 hours a day. Varnish has a viscosity of 1800 to 7000 SSU at 70° to 160° F., pumped at 150 psig. De Soto is highly pleased with fast transfer service and complete absence of repair costs and shutdown losses.



Sier-Bath "Gearex" Pumps



EXTERNAL GEAR & BEARING TYPE
for non-lubricating liquids



INTERNAL GEAR & BEARING TYPE
for lubricating liquids

Sier-Bath "Gearex" Pumps provide positive displacement, pulseless flow... quiet, vibrationless operation. Direct-connected up to 1800 RPM, they require no reduction gears. For high volumetric efficiency and long life there is no rotor-to-rotor or rotor-to-casing contact. Low pressure on stuffing boxes provides easy servicing.

Horizontal or vertical models to handle 32 to 5,000,000 SSU, 1 to 650 GPM, at pressures up to 350 psi. Corrosion-resistant alloys, steam-jacketed bodies, water-cooled bearings, other adaptations to meet individual needs. See "Yellow Pages" for your local Sier-Bath Pump Representative or send for Bulletin G-3. *Sier-Bath Gear & Pump Co., Inc., 9260 Hudson Blvd., North Bergen, N.J.*

Sier-Bath ROTARY PUMPS



Screw Pumps

Gearex® Pumps

Hydrex® Pumps

Founded 1905

Mfrs. of Precision Gears, Rotary Pumps, Flexible Gear Couplings

Member A.O.M.A.

Check 2770 opposite last page.

CURRENT LITERATURE

Quick-connect couplings are considered in 62-page catalog detailing complete specifications on line which gives 308,756 possible combinations. Coupling Cat—Snap-Tite Inc.

Check 2771 opposite last page.

Spray nozzles available for multiple-nozzle applications are taken up in Bul 105 and Cat 24—Spraying Systems Co.

Check 2772 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Steam traps are subject of bulletin available from Sarco Company, Inc.

Check 2773 opposite last page.

Steam-trap sizing, selection and maintenance for any pressure, temperature or load is information covered in 40-page Cat K—Armstrong Machine Works.

Check 2774 opposite last page.

Steam trap has only moving part. It is specified in Bul T-1743—Yarnall-Waring Company.

Check 2775 opposite last page.

Self-cleaning filters are specified in Bul EP-100—Industrial Filter & Pump Mfg. Co.

Check 2776 opposite last page.

Plant Engineering

Drives, of positive infinitely variable-speed type, are fully enclosed and available in eight sizes, 16 standard types, and capacities of $\frac{1}{2}$ to 25 hp. Full story is outlined in Book 2274—Link-Belt Company.

Check 2777 opposite last page.

Electrical enclosures of various types are pictured in Unilets Bul—Appleton Electric Company.

Check 2778 opposite last page.

Wire cloth is delineated in bulletin put-out by The W. S. Tyler Company.

Check 2779 opposite last page.

Electrical enclosures are reviewed in Bul 9990—Square D Company.

Check 2780 opposite last page.

lower cost

TEE BOLTS
by an exclusive method



Among Pawtucket's many specialty products are these lower-cost tee-head bolts. Pawtucket's exclusive production method keeps cost low, dimensional accuracy unusually high and strength above standard.

Pawtucket tee head bolts are made in standard sizes $\frac{1}{4}$ " and larger, or to your specifications. In any size, you can depend on a uniform Class 3 fit, if required.

All standard steels,
stainless steels and nonferrous
metals, including Titanium



FOR THREADED SPECIALTIES...

PAWTUCKET

MANUFACTURING COMPANY

327 Pine St. • Pawtucket, R. I.

THE PLACE TO SOLVE YOUR BOLT PROBLEMS

"The Bolt Man" T.M. REG.

Check 2781 opposite last page.

CHEMICAL PROCESSING

CURRENT LITERATURE

Stainless-steel fabrication is discussed in 40-page catalog available from the Kirk & Blum Manufacturing Co.

Check 2782 opposite last page.

Pre-engineered buildings are presented in publication of Butler Manufacturing Company.

Check 2783 opposite last page.

Oil reclaimer operates continuously and automatically. It is presented in Oil Reclaimers Bul — The Hilliard Corporation.

Check 2784 opposite last page.

Force-feed lubricators start, stop, speed-up and slow-down in synchronization with machinery. They are delineated in Force-feed Lubricators Bul—Manzel, Unit of Houdaille Industries, Inc.

Check 2785 opposite last page.

Anti-seize compound may be used at temperatures to 1800°F on all metals and plastics. It is specified in Fel-Pro CS-A Bul—Felt Products Manufacturing Co.

Check 2786 opposite last page.

Wire cloth, of brazed, seamless and Teflon-coated types, are among those reviewed in 120-page Wire Cloth Cat—The Cambridge Wire Cloth Co.

Check 2787 opposite last page.

WANTED:

To Keep You Alive

Almost everyone knows of some tricky unexpected danger situation in his plant. CHEMICAL PROCESSING feels that the dissemination of such information to readers is important. Therefore a monthly series on Chemical Boobytraps is now appearing in the Engineering and Safety section. (See page 140.) If you know of any such situation, please forward an account of it to:

Safety Editor
CHEMICAL PROCESSING
111 E. Delaware Place
Chicago 11, Illinois

Modern Aloyco casting operations pay off for customers!

As the world's leading specialist in the manufacture of Stainless Steel Valves, Aloyco constantly seeks new techniques, new equipment and new ideas for improving product uniformity and quality. Close integration between sales, engineering, foundry and all phases of manufacturing result in better control of quality, prompt deliveries, and more flexible customer service.

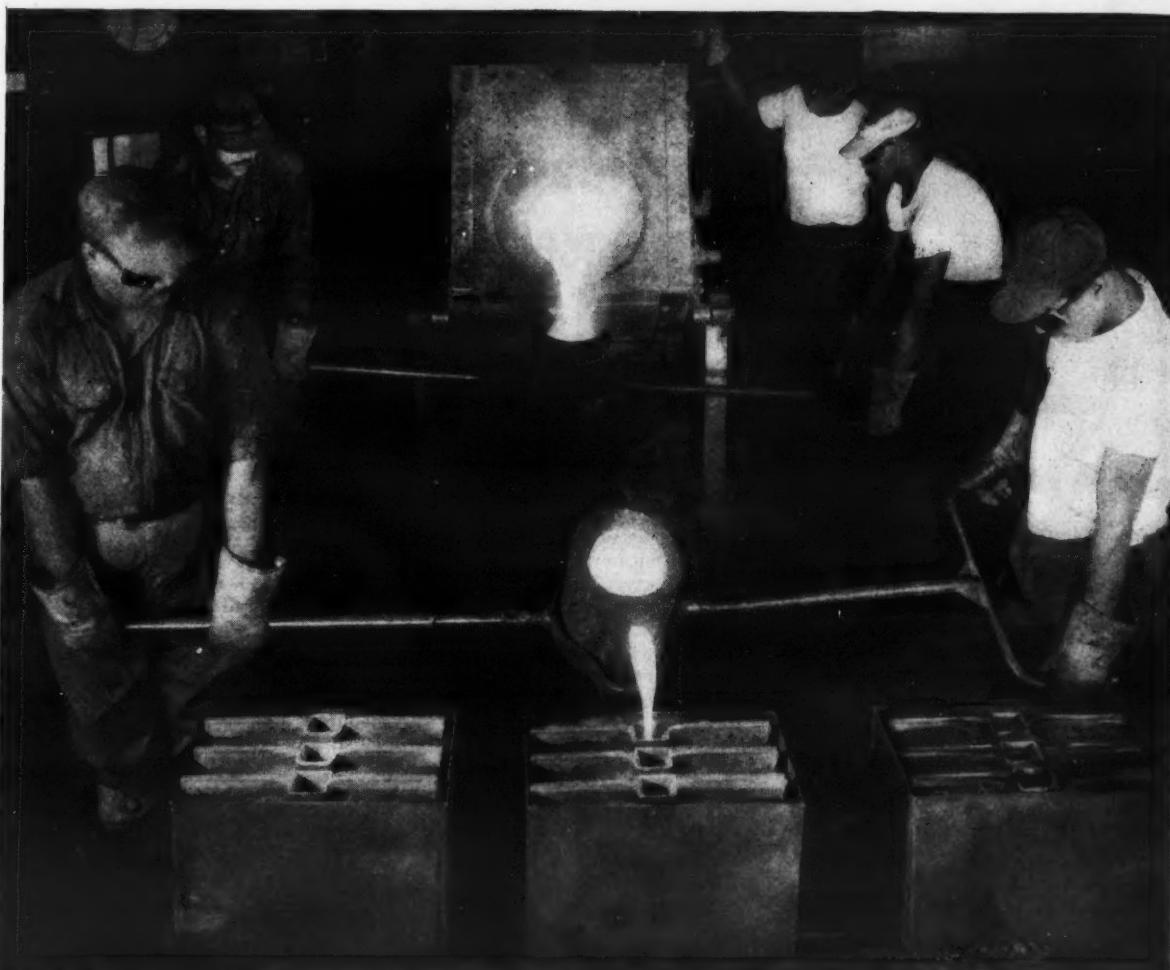
Aloyco combines over 30 years of specialized experience with the most advanced equipment for putting that experience to work on your corrosion problems. Technically qualified Aloyco men are available throughout the country to help you. Alloy Steel Products Co., Inc., 1302 West Elizabeth Ave., Linden, N.J.

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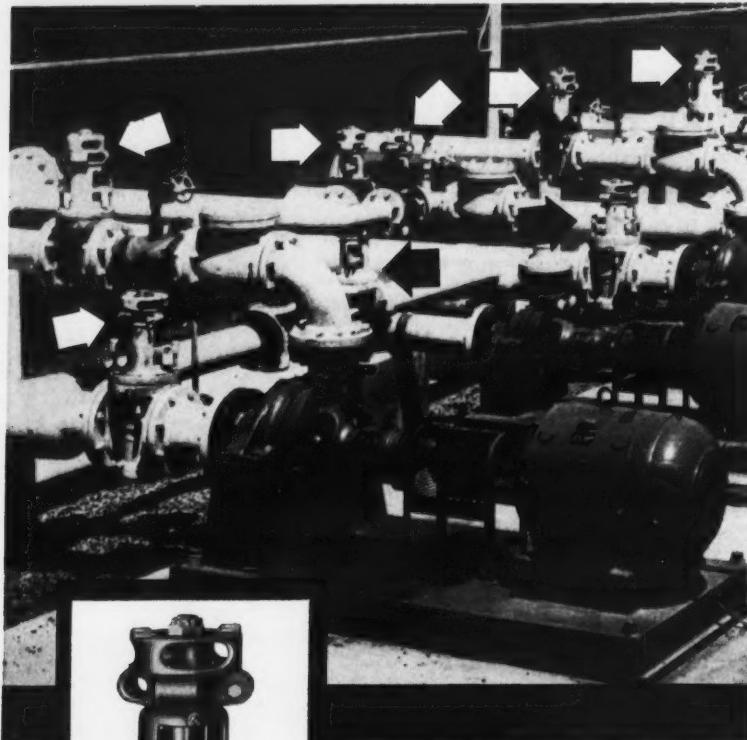
ALLOY STEEL PRODUCTS COMPANY

Boston • New York • Wilmington • Atlanta • Birmingham • Baton Rouge • Buffalo • Pittsburgh • Chicago • St. Louis • San Francisco • Los Angeles • Seattle



Part of Aloyco's foundry facilities include modern shell moulding techniques which permit unusually high dimensional accuracy. Radiographic inspection and dye penetrant testing are part of a comprehensive and rigid control program that assures castings of highest quality and uniformity.

Check 2788 opposite last page.



Eliminate the expense and trouble of valve lubrication with

HAMER PLUG VALVES

Hamer Plug Valves are unsurpassed for sure sealing, ease of operation and low maintenance cost. Being non-lubricated they not only eliminate the cost of lubrication but also prevent contamination of line product. The powerful plug adjusting nut acting as a screwjack is a positive means of raising and lowering the plug when operating the valve.

The plug and body seats are finished on special grinding machines and individually matched for precision fit, assuring smooth operation and perfect sealing.

Hamer Plug Valves are available in sizes 2" through 12" in working pressures to 600 lbs. W.O.G. Ask your Hamer Valve Specialist for complete specifications and applications of Hamer Plug Valves. Write for new catalog.



WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

Division of CHIKSAN COMPANY a subsidiary of
FOOD MACHINERY AND CHEMICAL CORPORATION



HV-3-60



Check 2789 opposite last page.

CURRENT LITERATURE

Loosening tough nuts is job of manual wrench which releases torsional impact every time handle is advanced slightly more than 30°. Wrench multiplies torque applied to handle more than 15 times. It is explained in Swench Wrench Bul —Marquette Division, Curtiss Wright.

Check 2790 opposite last page.

Storage-tank-equipment selection, design and operation are topics of the publication, "Blue Book" — Proteco-seal Company.

Check 2791 opposite last page.

Integrally finned tube of various style is available in number of alloys. It is covered in Trufin Bul—Wolverine Tube Division, Calumet & Hecla, Inc.

Check 2792 opposite last page.

Valves

Sanitary valves are air-operated. They are pictured in Sanitary Valves Bul — Alloy Products Corp.

Check 2793 opposite last page.

Ball-valve line has models available in Types 303, 316 and Alloy-20 stainless steels, as well as other plastics and alloys. Interchangeable seats and seals are available in Teflon, Nylon, Buna-N, Neoprene, Hypalon and natural rubbers. They are reviewed in booklet, "At your Service" Literature —Jamesbury Corporation.

Check 2794 opposite last page.



Troublesome maintenance and lubricating problems are eliminated when you specify Thomas "All-Metal" Flexible Couplings to protect your equipment and extend the life of your machines.

Like a thief in the night an inadequate coupling causes wear and damage to your machines — resulting in high maintenance costs and costly shut-downs.

NO MAINTENANCE
NO LUBRICATION
NO WEARING PARTS
NO BACKLASH

UNDER LOAD and MISALIGNMENT
only THOMAS FLEXIBLE COUPLINGS
offer all these advantages:

- Freedom from Backlash
- Torsional Rigidity
- Free End Float
- Smooth Continuous Drive with Constant Rotational Velocity
- Visual Inspection While in Operation
- Original Balance for Life
- Unaffected by High or Low Temperatures
- No Lubrication
- No Wearing Parts
- No Maintenance

Write for our New
Engineering Catalog 60



"Hereafter, when someone asks what we do up here, don't tell them we're just a bunch of graphers."

Henry Gaines Goodman, Union Carbide Chemicals

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

Check 2795 opposite last page.

CHEMICAL PROCESSING

Plug-valve line has models available in $\frac{1}{4}$ to 10" sizes for 150- and 300-psi classes. Applicable in services at temperatures of -150 to +400°F, valves are delineated in Plug Valves Bul—Continental Manufacturing Company.

Check 2796 opposite last page.

Ball-valve line is topic of bulletin available from Jamesbury Corp. Check 2797 opposite last page.

Ductile iron plug valves, with Teflon sleeves are non-lubricated. Available in sizes of $\frac{1}{2}$ through 6" and rated 150 psi, they are covered in Bul V/12—The Duriron Company, Inc.

Check 2798 opposite last page.

Plug-disc bronze globe valves are produced in 150-, 200-, and 300-psi pressure classes in full range of sizes. They are tabulated in Cat 60—Industrial Products Group, Crane Company.

Check 2799 opposite last page.

Material Handling

Tractor-shovels incorporate two-stage dry-type air-cleaner systems. They are topic of publication, "Industrial Materials Handling From A to Z"—The Frank G. Hough Co., Subsidiary of International Harvester Company.

Check 2800 opposite last page.

Vibrating-conveyor selection is subject of Cat 66—Ajax Flexible Coupling Co. Inc.

Check 2801 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Fork-lift-truck power unit features two wheels instead of one. It is interchangeable on all trucks in manufacturer's line. It is described in bulletin available from Lift Trucks, Inc.

Check 2802 opposite last page.

Fork-lift trucks are specified in bulletin available from Towmotor Corporation.

Check 2803 opposite last page.

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NOW PARKER HAS ELIMINATED A MORE SERIOUS ANNOYANCE ... LOST TUBE FITTING FERRULES!

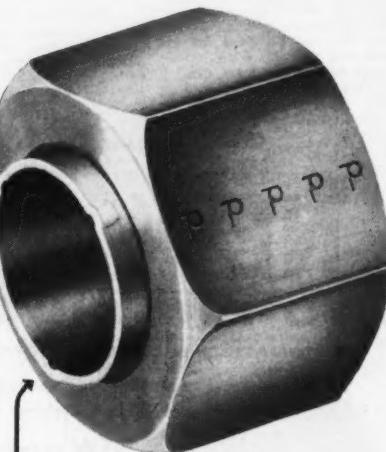
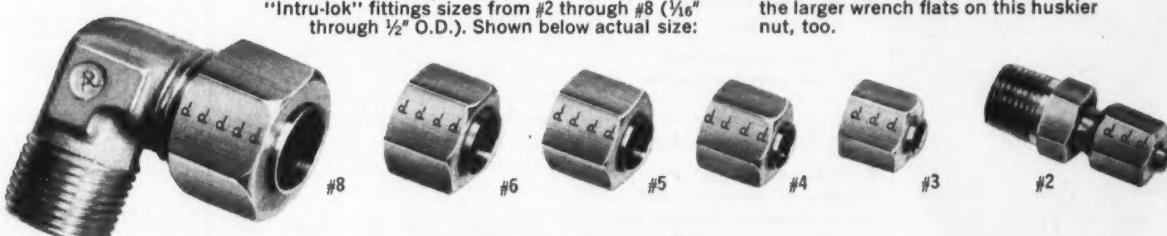
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The new nut with captive ferrule is available on all "Intru-lok" fittings sizes from #2 through #8 ($\frac{1}{16}$ " through $\frac{1}{2}$ " O.D.). Shown below actual size:



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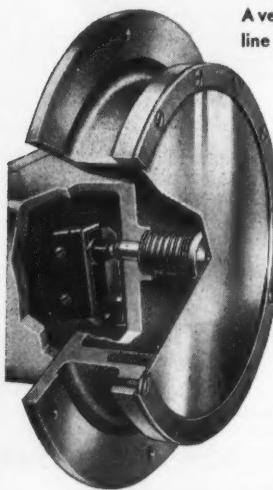
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Fluid and gas pressure tanks of various types are tabulated in Tank Cat—Groban Supply Company.

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Multiwall shipping sack has seamless polyethylene tube which is heat-sealed above sew line. It is presented in MPS Shipping Sacks Bul—Raymond Bag Corporation, Division of Albemarle Paper Mfg. Co.

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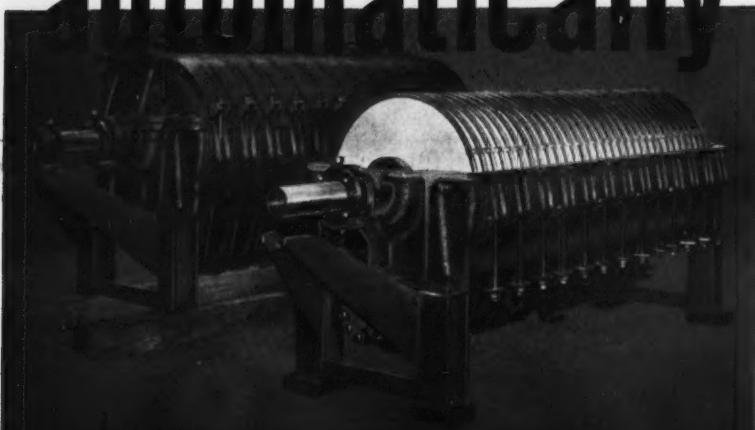
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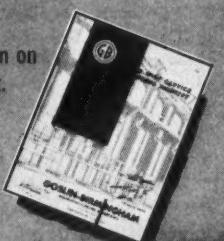


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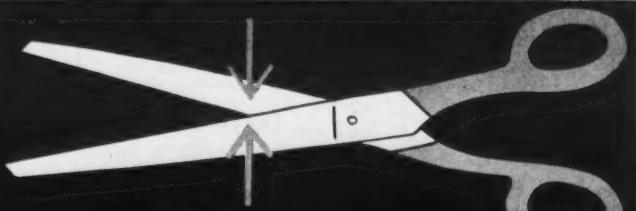
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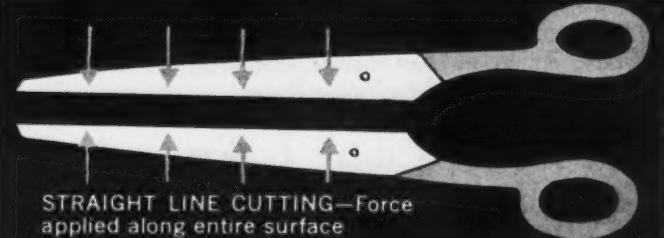
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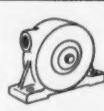


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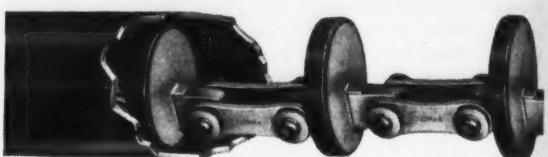
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Linac burst causes flower-like pattern in lucite disc

Gamma burst of A-bomb simulated by linac

A linear electron accelerator, capable of bombarding objects with a gamma radiation pulse similar to that produced by an atomic explosion, is being used at the White Sands Missile Range, N.M., to study effects of radiation on missiles.

The machine, built by Hughes Aircraft Co., produces a single pulse of about 10 million volts of gamma radiation.

Two 5-million watt klystron tubes inject microwave energy into the high vacuum of the linac's 30" accelerator tube. Then an electron gun fires electrons which ride the microwaves, picking up speed at a rate of about 4-million volts for each foot traveled. At the exit, the pencil-size electron beam strikes a target of heavy metal creating a gamma radiation pulse which is emitted in the form of energy waves and in the shape of a cone about 30° wide.

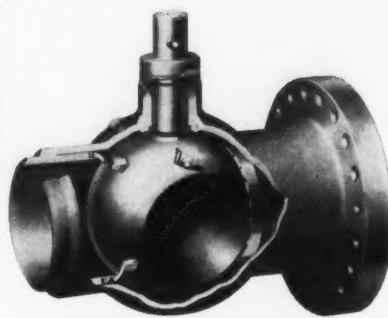
Objects to be tested are placed in this cone. Instrumentation connected to the component "blasted", reveals the effects of the burst.

All-weather repellent protects nursery stock

A repellent, containing thiram, protects surfaces of plants from rabbit and meadow mice damage for up to six months, field tests indicate.

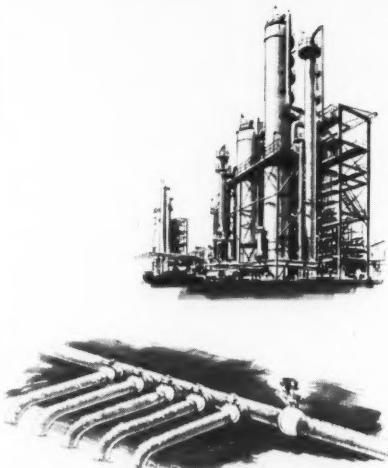
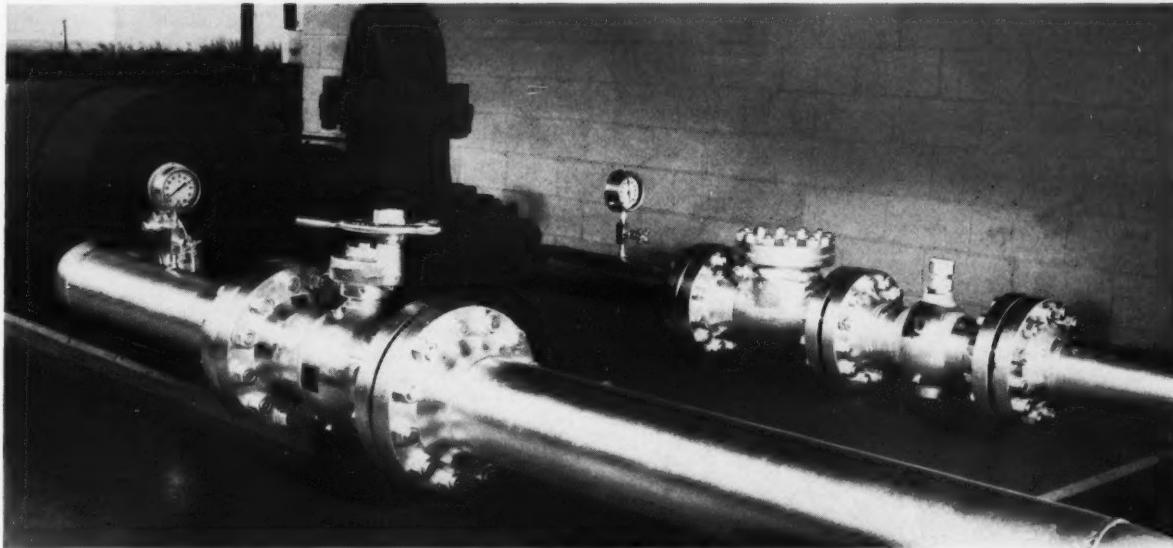
It may be applied during the dormant or growing seasons by spray, dip or brush. The product, to be known as Penco Thiram Animal Repellent, will be offered to nurseries through the Agricultural Chemicals Division, Pennsalt Chemical Corporation, Tacoma, Wash.

SAY GOODBYE TO VALVE REPAIR



That's right — with Cameron Ball Valves on the job you never need to make repairs. This big step forward in valve design — which makes practical the "sealed for life" construction — is brought about by the exclusive rotating seat principle which has proven so successful in our Type "F" Gate Valves.

Sturdy dogs on the Ball engage gear-like teeth on the Seat Rings to rotate the Seats a fraction of a turn each time the valve is opened. In all valves, maximum wear occurs on the seating surface area which is struck by the erosive blast of line fluid just as the port is uncovered on opening, or just as the flow is being pinched off on closing.



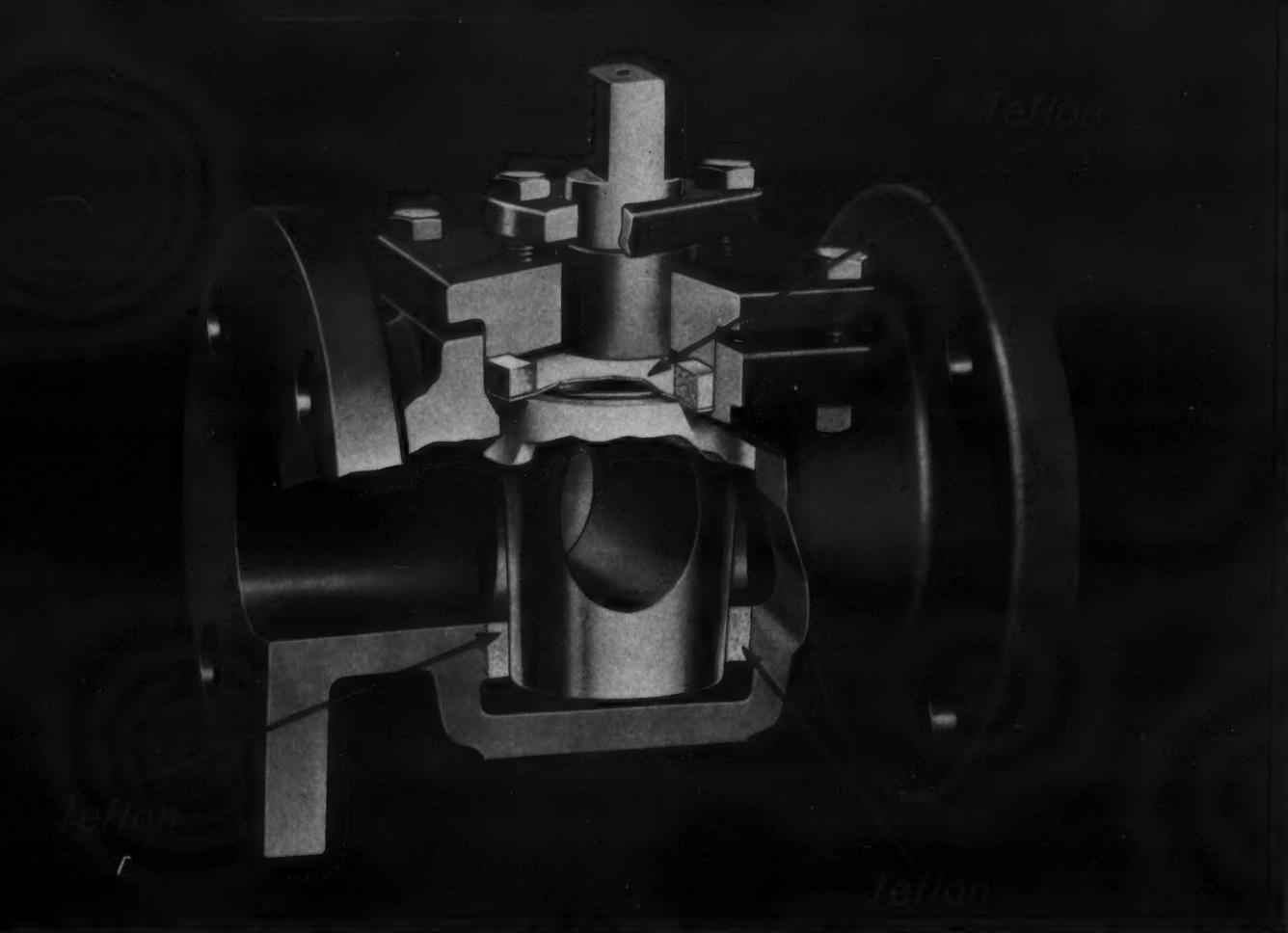
Rotation of the seats distributes this wear equally over the entire sealing surface and extends the life of the valve many times over valves with stationary sealing surfaces.

Also, being non-lubricated, all maintenance costs are eliminated. This means substantial savings in man hours, down time and inventories. Low torque requirements allow smaller operators — less energy on remote controls — easier operation on manual controls. Maximum economy — Maximum service — Minimum size and weight. Available in sizes 2" to 36" in ASA and API ratings and with any type of end preparation. If you plan, specify or purchase valves, call or write Cameron for complete details.

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